

electrical contracting

With which is consolidated *The Electragist and Electrical Record*
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JUNE, 1938

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ORANGEBURG

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Its cable protective qualities, you know.

Trouble-free service is assured.

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ORANGEBURG

electrical contracting

JUNE, 1938

The Fish Are Right

DEER AND FISH DON'T AGREE. Deer watch out for things that move. Sight a buck across the glade and take one step and he's high-tailing it away. But fish don't do that.

OUR FRIEND SAM HIBBEN FOUND THIS OUT while flirting with Bermuda mermaids. In a diving helmet, he's been walking on the bottom of the sea, illuminating barnacles. Well, Sam says, if a man stands still the fish are alarmed. But if he drifts along, just swaying with the current like the sea weed, why they come right up.

NOW ELECTRICAL CONTRACTORS ARE LIKE THE DEER. When people begin to move—to build or modernize—they take notice and try to sell something. But the fish are right. It would be smarter to watch out for those who stand still. They're more of them. They need more help.

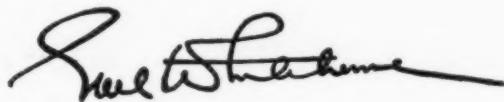
ON EVERY BUSINESS STREET IN EVERY CITY there are stores, garages, gas stations and shops that are behind the times and don't know it. They need better light, a ventilating fan, maybe a heating device or motor appliance. They need it to increase production, improve conditions, attract customers, meet competition.

BUT THEY DON'T KNOW WHAT TO DO. And we don't show them. And so they drag along, falling behind. And we lose the business—don't even know it's there. We think nothing is moving. We miss the fact that we can do the moving ourselves.

THE FISH ARE RIGHT—but you don't have to be a fish to use the system. The trick is simple. You move around and cock an eager eye, watching for local business men who are standing still. You study them.

HOW DO YOU STUDY THEM? That's simple too. You ask yourself—"What could I do if I was running a garage?" You think like a garage man—about his problems—then go and talk to one and wake him up and get the job. Then while it's in your head, you work on the other garages. Then do the same thing with groceries, beauty shops. Take one group at a time.

AND REMEMBER—CUSTOMERS ACT A LITTLE LIKE FISH TOO. If you look dead, they don't come around either. It works both ways.





Star customer!

Electrical Contractors have always been "star customers" to us.

That's why we've shaped our business to meet the Contractor's needs completely...to give him prompt service...to make our products conveniently available to him.

Regardless of what kind of work you specialize in, you'll find Graybar equipped to serve

you with *everything electrical*. You'll find a well-stocked Graybar warehouse near you to supply *what you want...when you want it...where you want it*. You'll find Graybar specialists in particular lines always glad to help you with experienced advice.

Try Graybar for everything you need. We're only as far away as your telephone.

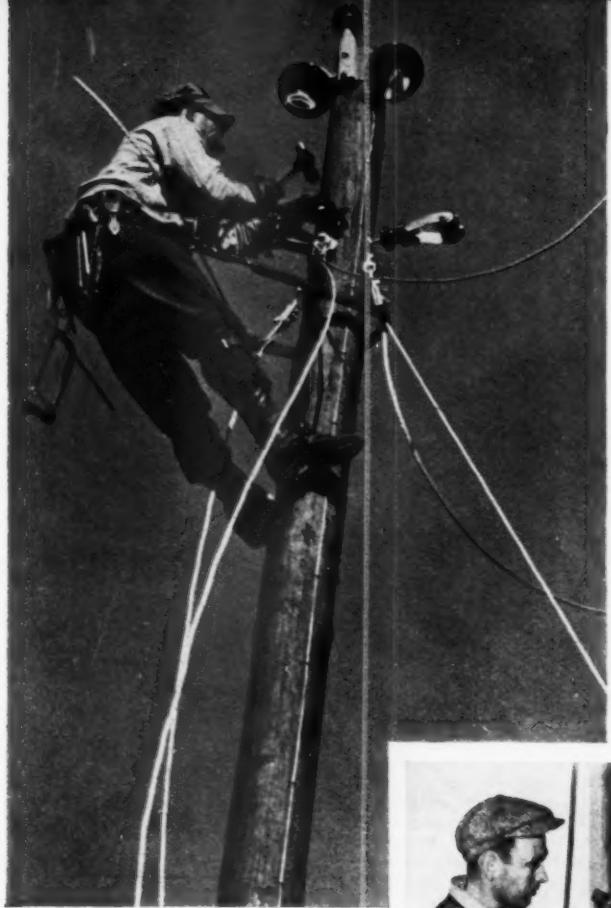
**Everything electrical for all
types of Contracting—**



GraybaR



OFFICES IN 85 PRINCIPAL CITIES... EXECUTIVE OFFICES: GRAYBAR BLDG., NEW YORK, N. Y.



NEW PRACTICE in line construction has sprung from this boom in farm lines and low cost light.

THREE years ago, there were some 650,000 farms using electricity in this country. In May 1935, the Federal Government launched its Rural Electrification Program. Up to the first of this year, more than 170,000 rural consumers have been connected to farm lines constructed by farmers' cooperatives. Also, more than 370,000 new rural customers have been taken in by power companies. During this period, the co-ops built some 53,000 miles of rural lines, the power companies 71,000 miles.

Citizens may argue on the principles involved in this kind of government activity, but for the electrical contractor the fact remains that suddenly better than 440,000 rural families have had their houses and farm buildings wired and begun to use electricity. REA expects that another 200,000 consumers will be taken on by further co-op lines. Probably the power companies will continue their suddenly awakened efforts to extend their farm lines, as long as the co-ops are active, and will add more new rural customers, as they have been doing since REA started.



NEW WIREMEN have come into farm work, some untrained, some co-op schooled, but qualified contractors are taking over more and more.

Taking it all in all, this is the most important thing that has happened in the wiring business for a long while. It concerns every electrical contractor. It is important for every contractor to know not only what is happening, but what he wants to do about it, what part he wants to play in it—if any.

In the beginning, many strange things happened, and reports were going around of a highly alarming character.

HOW ABOUT

Farm Wiring?

By Earl Whitehorne

A plain statement of what has been happening and what it means to the electrical contractor

Co-ops were starting half cocked—carried away with enthusiasm for this local bounty from the New Deal. Paving contractors were building lines. Garage mechanics and handy men were wiring buildings, with poor materials and methods and no inspection—except the lines, of course. This was nothing new, for the farmer has been doing his own wiring for a long while. But with so much of it, it looked bad and the electrical contractor was naturally outraged.

And in the course of time—and a very short time, at that—REA and the co-ops found out that all was not well. They found out also, that unless farm houses are adequately wired and plenty of appliances are installed, there will be small chance that these farmers' associations will ever repay the money the government loaned them or be able to successfully operate these local power systems. The revenue will be too small.

About this time, John Carmody was made REA head man and Carmody is a blunt spoken, two fisted, energetic egg who is afraid of nobody and gets things done. To meet this situation, he

set up a Utilization Division. He put in charge of it one George Munger. Munger was trained by the Central Hudson Gas and Electric Company, and for years worked on domestic load building and later on developing contractor and dealer activity in the Hudson Valley. He was also secretary of the Hudson Valley Contractors Association. Then he went down to help the Tennessee Valley Authority get going in building load and setting up good trade relations. Later they moved him to the Electric Home and Farm Authority that finances appliance and now wiring sales.

So Munger knows wiring and appliances, and what can be done and what should not. There are plenty more on the REA staff, but it is these two, who have been intimately concerned with getting this matter of wiring on the right track.

Three things have happened—

First, a splendid educational program has been set up to prepare the rural family for the use of electricity, by selling the farmer and his wife on the need for safe and adequate wiring, providing enough outlets and capacity for the appliances they will need.

Second, so much emphasis has been put on the importance of good workmanship that today, REA says 90 per cent of the farm wiring on government-financed co-op projects is being done by competent contractors.

Third, to protect the farmer against unsafe wiring, inspection has now been set up in 39 states through REA-state cooperation, whereas only five states had any rural inspection before.

This REA educational program is highly organized and most effective. It embraces both home economics and agricultural engineering. It works closely with the Agricultural Department's county demonstrators. It shows the co-ops what customers they ought to connect and what these customers should use, in order to make the project successful, both financially and in its service to its members. To do this job, they have six women and twelve men in the field, expert demonstrators trained by power companies electrical manufacturers and elsewhere. Since last September, they had held over 1000 demonstrations in rural centers all over the country. They have told their story of light, appliances and wiring to more than 110,000 people, in audiences that were 90 per cent farm folk out of the neighborhood.

They provide the co-ops with a complete, coordinated program, an exceedingly clever advertising campaign, that goes out in the name of each co-op to its members. It embraces five steps—

RURAL DRAMA in Lancaster County, Nebraska, as farm families turn out to listen to the local congressmen and see the lights turned on.



Step 1—When the Loan Contract is Approved—A letter, a booklet—"Wiring Your Farm and Home"—and a Check List—"Plan a Common-Sense Wiring System." A second letter follows a month later with a wiring leaflet—"Dollars in Your Pocket". Then comes a directors meeting to adopt a wiring and plumbing program, then a meeting for wiring and plumbing contractors, group meetings of members, a wiring and plumbing survey, then applications for loans, then bids, then contracts. Meanwhile, a series of local newspaper stories.

Step 2—When Construction Contract is Approved—Letter No. 3 on wiring, lighting and plumbing, with a folder—"Get this Better Satisfaction with Electric Light"—a newspaper story, posters for contractors, dealers and general stores.

Step 3—When Construction Begins—Letter No. 4, with a booklet—"Electrifying Your Farm and Home", a plumbing leaflet, a newspaper story, then a dealer meeting, then group meetings of members to explain the "Wiring Check List", then a round up of wiring contracts.

Step 4—One Month After Construction Begins—Letter No. 5, with a leaflet—"Home and Farm Appliances", group member meetings with films, to sell complete wiring, another newspaper story, then another round up of contracts.

Step 5—When First Section is Energized—Letter No. 6, an all day ceremony of turning on lights, a newspaper story, a follow up on dealer appliance selling, then a final round up of wiring and service contracts and connections.

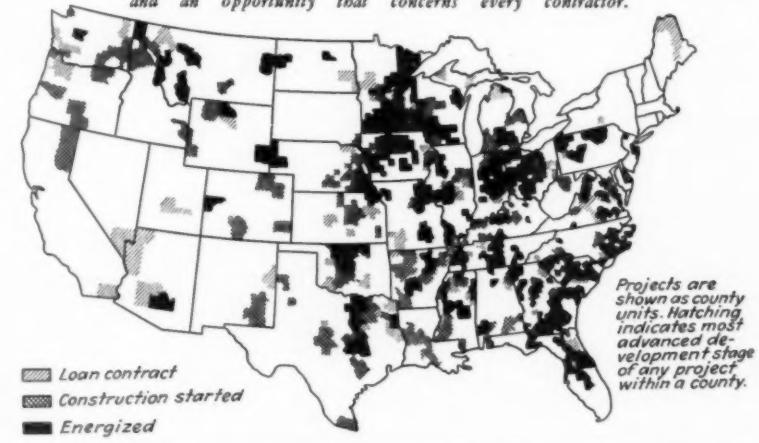
All this advertising material is well written and illustrated. It is furnished to the co-ops without charge, in quantities to cover their membership. And this clever promotion works up a community interest that is amazing. They set up displays of equipment and demonstrations of electric cooking and laundering and play to packed audiences.

They have a wiring demonstration, in which the wiring is strung step by step on a back drop, to show the need for both outlets and capacity. At the ceremony of turning on the lights, great enthusiasm builds up. In Alma, Georgia, for example, the farmers met in the school house and, when the electric lights flashed on, the crowd rose with a whoop and threw the kerosene lamps out the windows.

Munger has a man in charge of wiring promotion, who knows his job. His name is John Pyles. He had been a supervisor of outside construction for a Baltimore engineering firm, then had his own business specialized in rural work.

Meanwhile, the electrical contractor found out something too. In the beginning he was afraid of this co-op work. It did not fit into his experience. He was upset by the early mistakes. Gradually he discovered that he didn't know much about rural wiring, that new methods were needed—and organization. Pyles says there is now a steady trend toward more and more work done by qualified electrical contractors. The group bidding plan is gaining in favor, as it is more under-

ACROSS THE MAP this rural work is going ahead, an influence and an opportunity that concerns every contractor.





CO-OP EXHIBIT at Johnson County, Indiana, Fair to show the rural folk how buildings are wired and what electrical appliances will do.

stood by bidders. The plan is working. Contractors meet and work out a basis for an average installation and then bid for the amount that each man wants to handle. The other contractors very often offer then to take work at the same figure. Each participating contractor goes to his allotted customers and secures his contracts direct, and usually finds that considerably more work is wanted. The customer pays 20 per cent cash, the co-op supplies the balance.

This group plan is now operating in more than 100 places and the work is being divided among as many contractors as possible. Some large contractors are now specializing in this rural work and installing wiring for many projects. In other cases, small contractors pool their resources. Here, one responsible contractor makes the contract and the smaller men work with him for a percentage of the profits. Sometimes one will specialize on outside work, another inside, another on services.

Fixtures have been troublesome. Catalogs are elaborate and selection is so difficult that too many farmers have

installed drop cords. Fixture manufacturers are now cooperating with REA to lick this one.

The inspection situation was difficult and alarming. Too much jerry wiring was going in. It looked as though a



lot of barns would be burned down. And only in Michigan, Minnesota, North Dakota, Oregon and Washington were any provisions made for inspection in rural areas. REA took it up with the state fire marshals and in 39 states and has arranged some basis for inspection of wiring on government financed projects. In some cases, the fire marshal appoints inspectors selected by the co-ops, in some places underwriters men are used. These men go to a school, conducted sometimes by the state college or by the fire marshal or a power company. They pass an examination, and are reviewed and rated by REA. They are paid in fees received from the contractors for inspections and work independent of the co-ops, under the authority of the fire marshal, or the

State Rural Electrification Commission or the Wisconsin Coordination Committee, for example.

There are now 300 inspectors at work. Some of them were journeymen, some former contractors some former power company linemen.

Fully 100,000 co-op customer installations have now been inspected.

There are now 400 cooperatives—not all Federally financed—organized to serve some 300,000 electric consumers. The interesting thing to the electrical contractor is that here are nearly 450,000 new users of electricity, who may be expected to need more wiring from time to time, as well as maintenance and repairs. And according to REA, 200,000 more are in prospect.

The movement is still young but already it has produced some interesting experience. It has proved several things.

NEW DEAL for the farmer's wife when R.E.A. demonstrators in Troop County, Georgia, make their husbands cook a dinner by electricity.

1. That farm lines can be built by new methods at lower costs than formerly prevailed;
2. That farm homes and barns can be wired by competent contractors, if they will use specialized methods in group operations;
3. That where this is not done, others will install the wiring and the contractor loses the business;
4. That mass production rural wiring can be installed at prices less than the usual city work; and,
5. That inspection can be maintained in rural areas under the Code.

All this is certainly important to the electrical contractor. And if it is important to him, it is important to the rest of the electrical industry.

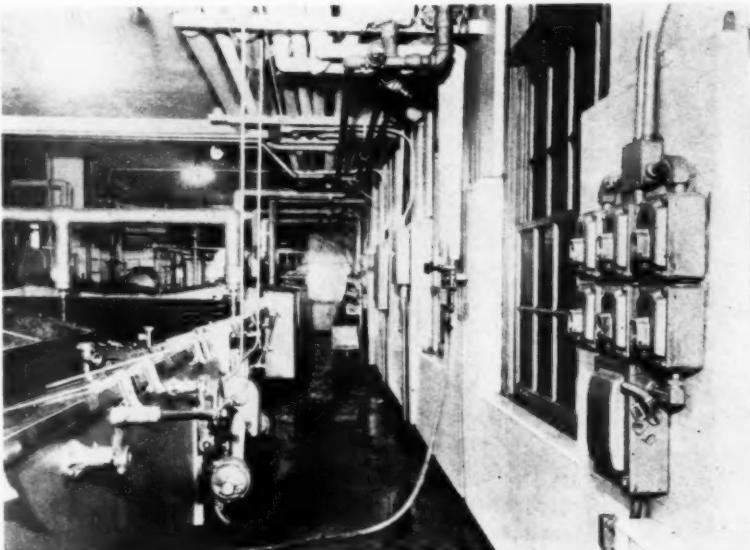
57 IDEAS for MODERN DAIRIES

MODERN dairies pride themselves upon sanitation, and the finest of equipment for handling perishable products. Efficient operation requires good lighting, convenient controls, correct motor application, and a wiring system properly designed to withstand moisture and steam-laden atmospheres.

Maintenance costs run high unless care is taken to select vapor-proof enclosures for starters, panels, switches, lighting units and general wiring devices, in all rooms where frequent washings and hoseings of equipment occur. And because new dairy plants usually employ tiled walls, the exact locations of equipment should be determined during early stages of construction, to permit the concealment of conduits and other raceways between points of termination.

The accompanying list of "Things to Remember" will provide a helpful guide list of equipment to be considered and electrical services to be recommended when a new dairy plant is being constructed in your town.

The Third of a Series of Industrial Reminder Lists to Help the Electrical Contractor Sell Complete Wiring Layouts



ABUSE PROTECTION—Dairy plants are full of steam condensation, splashing and dripping water. It requires careful selection of the electrical equipment and fittings. (Allen Bradley equipment in the picture.)

CHECK LIST OF DAIRY EQUIPMENT

MOTOR APPLICATIONS

- Air Conditioning
- Auto Trucks
- Bottle Cleaners
- Bottle Fillers
- Butter Cutting Machines
- Butter Printing Machines
- Butter Tampers
- Butter Workers
- Churning
- Concentrators for Making Oil out of By-Products
- Conveyors
- Cream Separators
- Drop Hammers
- Egg Testers
- Emery Wheels
- Fanning Mills
- Fans
- Hack Saws
- Heating Plant
- Hovers
- Ice Breakers

- Ice Cutters
- Milk Clarifiers
- Milk Mixers
- Milk Shakers
- Milking Machines
- Oat Crushers
- Pasteurizers
- Pumps, All Kinds
- Refrigeration
- Vacuum Cleaners
- Vulcanizers
- Vehicles

ELECTRICALLY HEATED EQUIPMENT

- Branding Irons
- Electro Culture
- Fly Catchers
- Food Warmers
- Glue Pots
- Hot Plates
- Molasses Heater
- Ranges
- Solder Pots

- Soldering Irons
- Sterilizers
- Water Heaters

SIGNALING DEVICES

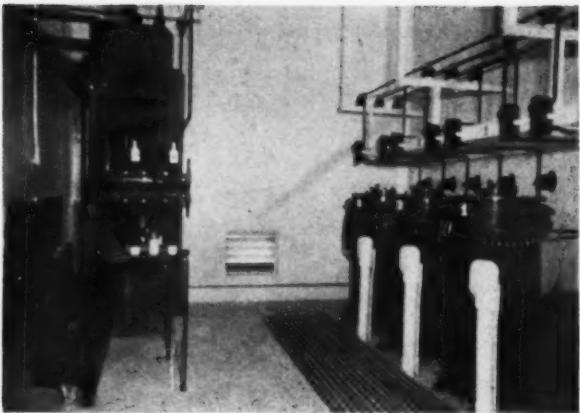
- Annunciators
- Burglar Alarms
- Bells or Howlers for Start and Stop Signals
- Code Calls
- Fire Alarms
- Buzzer System
- Telephones
- Time Clocks
- Time Stamps

ILLUMINATION

- Recommended General Illumination 20 foot candles
- Supplementary lighting for any operations which require critical seeing
- Special protection of units against moisture and corrosion



MAIN DISTRIBUTION from this dead front switchboard includes externally operated double-throw switches for switching light feeders over should one of three transformers fail.



ADJOINING ROOM to the main board contains the power and lighting transformers and main oil circuit breakers controlling the 2300-volt service

Wiring a Canadian Munitions Plant

An example of military construction which meets the production demands of the Royal Canadian Army



BENCH WORKERS will have 100-watt polished aluminum local lighting units to supplement general overhead units.

REMOVED from the curious eyes of old Quebec's annual swarm of vacationists, Camp Val Cartier is acquiring a modern plant where highly-explosive war materials are being compounded. Here shells are filled, intricate explosion and velocity tests conducted by ordinance experts, and many other technical operations carried on incidental to the changing demands of national preparedness. So, the structures, specially designed to house all this production and testing equipment, were wired unsparingly.

This series of picture covers the work installed by Goulet, Ltd., of Quebec, in a project that will cost about \$100,000 for wiring all of its sections. Nearly complete when photographed, the methods of electrical construction illustrate how our Canadian cousins proceed in laying out their equipment and show how intelligent planning can make the most of a rather difficult structural condition. The project comprises some 100,000 square feet mainly on one floor, with a series of connected wings.



EXPOSED WORK predominated, but feeders were racked to avoid interference with flexibility of branch conduit routings.



BROAD PARK AREAS between buildings, harmonious variations in the face brick coloring and an angular layout eliminates any suggestion of monotonous symmetry in this project.



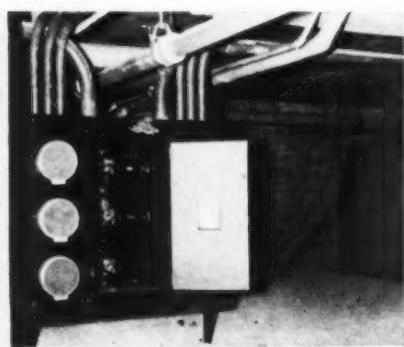
MODERN RANGE installed in each kitchen is plugged into a standard range receptacle. The circuit breaker panel above controls the apartment circuits.

Housing Project

Low cost apartments for a negro colony in Indianapolis, provides well planned electrical facilities



CONDUIT WIRED throughout, all wiring is concealed on the upper floors. Basement feeders are run exposed on hangers. Cuts and threads are leaded.



ENTRANCE SERVICES from the transformers are distributed to the main feeders through a main switch and four safety switches. A neat wiring trough is used to facilitate connections.

CIRCUIT and feeder capacities designed for modern residential loads are an outstanding feature of the recently completed low rental housing project in Indianapolis, Ind. Lockefield Garden Apartments was one of the first slum clearance projects developed under the Federal Emergency Administration of Public Works. The site was cleared of 253 old houses and construction started in 1935. The completed project consists of 24 modern apartment buildings and will house a small city of 3000 people in the negro residential area.

Architects William Earl Russ and Merritt Harrison of Indianapolis designed the project which contains a total of 748 apartments, 12 stores and 37 garages, and covers an area of 22 acres. More than three quarters of the land is devoted to lawns and play areas, landscaped and planted with trees and shrubs. The electrical contract, one of the largest ever let in the state of Indiana, was handled by the C. L. Smith Electric Company of Indianapolis.

The minimum wire size on the job is No. 12 and installed in galvanized conduit with $\frac{1}{2}$ inch minimum. Each apartment unit is served by a three circuit



LAYOUT drawings were essential. Complete plans were prepared by the contractor showing the exact conduit layout, pull box sizes and location. The location of each outlet was dimensioned. E. F. Burkenn, Superintendent studies the drawings.

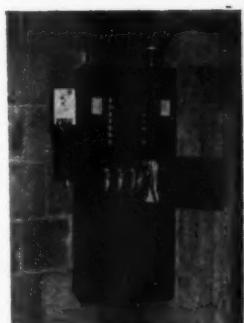
+ Well Wired

load center panel located in the kitchen. Individual four-wire No. 4 feeders extend to the basement distribution panel. Although the cost of electricity is included in the rental, provisions are made at the distribution panels for metering any individual apartment.

The modern kitchens are provided with three-plate electric ranges and electric refrigerators. A cord drop plug receptacle is suspended from the kitchen lighting unit. No ceiling outlets are installed in the living rooms, but two plug receptacles, a radio receptacle and a telephone outlet are provided. Each bedroom is furnished with a side wall bracket and two duplex plug receptacles.

A central laundry in the basement of each building is completely equipped with tubs, electric hot plates and combination switch-pilot-receptacles adjacent to the built-in ironing boards. Unit heaters are installed to circulate warm air through the long drying rooms.

Although aiming toward low unit costs, the designers of the Lockefield project have recognized the trend toward higher domestic loads among families in the lower income group. While fixtures and other superficial devices are very simple in design, they are backed up by a wiring system of the highest quality in design, materials and workmanship.



ENTRANCE FIXTURES are modern in design and illuminate the background of the cutout numbers besides lighting the doorway adequately.

LAUNDRY CIRCUITS are controlled by a magnetic switch from a time clock, limiting the hours that the equipment may be used to avoid the peak.

DISTRIBUTION PANELS control each apartment through an individual circuit breaker. Meter blanks permit testing or sub-metering as necessary.



Money Makers for Motor Shops

Summary of two papers before the recent Convention of the National Industrial Service Association that offer practical ideas to bring in new profits.

Small Motor Repairs

By Frank M. Mielke

Mielke Electric Works
Duluth, Minn.

In an area where a volume of \$500.00 a month or more is available, small motor repairs should pay well. For a shop equipped for integral horsepower motors, the investment will be approximately \$2200.00. The largest item involves a dynamometer. This with a switchboard and instruments will cost approximately \$1000.00, and is essential to determine at what speed governor mechanisms and short circuiting devices function, how the motor accelerates and pulls into full load, how much of an overload the motor will take and bring up to speed, the current going into the motor, and if it has the proper torque; this, all in one operation.

Other tools consist of an arbor press with circular plates and jigs for removing commutators and rear end coil shelves, and for pressing bearings in and out of bearing housings, jigs for stripping, a rapid heating solder melting pot for soldering commutators and resoldering squirrel cage rotors by dipping, a 13" X 4' engine lathe with a full set of jig plates for boring bearing linings within the housings. Also a motor-operated reamer chuck with a full assortment of reamers and line reamers should be used in bearings not trued in a lathe. Other tools and apparatus include a 4½" jaw by 7" deep machinist vice, a growler, a capacitor bank in steps from 2 to 200 mfd, pulley pullers with jaws to accommodate fan pulleys and gears, a small drill press, an emery wheel, a varnish dipping tank, a well ventilated oven equipped with a pyrometer, a ground test transformer

(Continued on page 30)



LOAD TEST Board gives a complete picture of small motor characteristics—a must item for the shop servicing fractional motors. The shop mascot horns in.

CHECK LIST for the inspector, more items may be added indefinitely as the extent of the service is broadened.

INSPECTION CHECK LIST

ENTRANCE SWITCH.....	heating loose contacts overload
FUSES	heating loose contacts rating jumpers
STARTER.....	overload protection contacts relay settings dash pots
DRUM CONTROLLERS.....	contacts open circuits
COMPENSATORS	contacts overload protection oil level
MOTORS.....	gauge air gap heating loose terminals bearing heat oil quality oil level

Inspection Service

By John E. Launder

Independent Electric Machinery Co.
Kansas City, Mo.

MOTOR inspection can be sold to nearly every plant where a regular maintenance electrician is not employed and where there are ten motors or more. Even in some plants where maintenance men are employed, it is sometimes advisable to have them checked up.

The service man needs long practical experience in finding and correcting motor troubles. He should know where to look for them and be thorough in his methods. He should have good judgment, be very diplomatic. If possible to find that rare combination of engineer and salesman, he should possess the sales quality. Further, the inspector should be schooled in motor and power application, should keep up-to-date on electrical machinery, its application, its types and its development. He should be able to advise with the owner of the property as to the proper type of equipment to serve a specific purpose and know what is the best for such purpose.

Insurance companies who insure electrical apparatus say that most of the losses for which they pay could be avoided if the insured apparatus had been properly looked after. Lack of oil in bearings and burned contacts are two of the biggest trouble causers. Overload, of course, is always to be reckoned with. Therefore, an inspector should start in at the power entrance and check everything through to the last motor. The accompanying check lists are some of the things to look for. He should also use a megger freely. It

(Continued on page 45)

THE Electric Home and Farm Authority now offers to finance the wiring or re-wiring of old houses for customers of electrical contractors. This makes it possible for you to sell old house wiring on easy payments and to secure your money at once. The conditions of the EHFA are these—

1. A finance charge of 5 per cent per year on the original unpaid balance.
2. A minimum down payment of 10 per cent of the installed selling price to be collected and retained by the contractor.
3. A maximum period for repayment of 24 months.
4. Contracts with unpaid balances of less than \$40.00 not eligible.
5. Notes covering sale of wiring to be accepted without recourse on contractor.
6. Contractors required to guarantee all jobs against defective materials and workmanship for the term of the note, but not less than one year.
7. A maximum of 90 per cent of the cost of the installation to be eligible for financing, when covered by a negotiable note executed by the purchaser in favor of the contractor and endorsed by the contractor, without recourse, to EHFA.
8. The wiring financing plan to be available in territories served by utilities cooperating with EHFA in the financing of appliances.
9. The wiring finance plan to be confined to property owners or to tenants with property owners' endorsement on the note.
10. Utilities may be authorized to purchase customer paper for the account of the Authority, and referring doubtful credit risks to the Authority for disposition.
11. The collection procedure to be agreed upon by the utility and EHFA.
12. National Electrical Code, as well as state and local ordinances, codes and inspections to be observed. The utility to be required to sponsor these regulations.
13. Contractor to obtain credit acceptance from EHFA and satisfy utility that the job to be installed will be in accordance with its requirements as to quality and adequacy.
14. A proposal form describing the work to be done, price, monthly payments, and the purchaser's credit statement, to be submitted to the utility by EHFA.
15. Each completed installation to be inspected by the utility or other recognized inspector. A certificate of installation or completion signed by the customer, the inspector and the contractor, to be obtained before advancing funds to the contractor or submitting the note to EHFA for purchase.
16. In submitting notes covering cost of installing wiring to EHFA for purchase, utility will forward also a certificate of completion or installation, customer's credit statement and contractor's proposal.

This is substantially the procedure which has been successfully followed by EHFA in financing domestic electric appliance sales for dealers. In many cities served by important power systems this financing is now being done in large volume. But the financing of old house wiring was only authorized on April 14 last in an announcement by Jesse Jones, chairman of the Reconstruction Finance Corporation, Washington, D. C.

Briefly, step by step, here's what will happen in financing old house wiring under this new EHFA program—

17. Utility enters into an agreement with EHFA covering the regulations.

24. The contractor endorses the purchaser's note to EHFA without recourse and receives the face amount of the note, less finance charge, from the utility or EHFA, as the case may be.

25. The customer is billed for installments each month by the utility at the same time electric service bills are rendered.

The Federal Government now makes this financing service available to you. Contractors in every city should discuss this new easy payment plan together and with their local power company. Additional information can be secured from the Electric Home and Farm Authority, Washington, D. C.

Easy Money for Old House Wiring

Installment Financing now available to electrical contractors on favorable terms when local power companies will cooperate

18. Contractors are notified in writing by EHFA of their authorization to finance wiring installations, and informed of the standards and minimum requirements agreed to by the utility and EHFA.

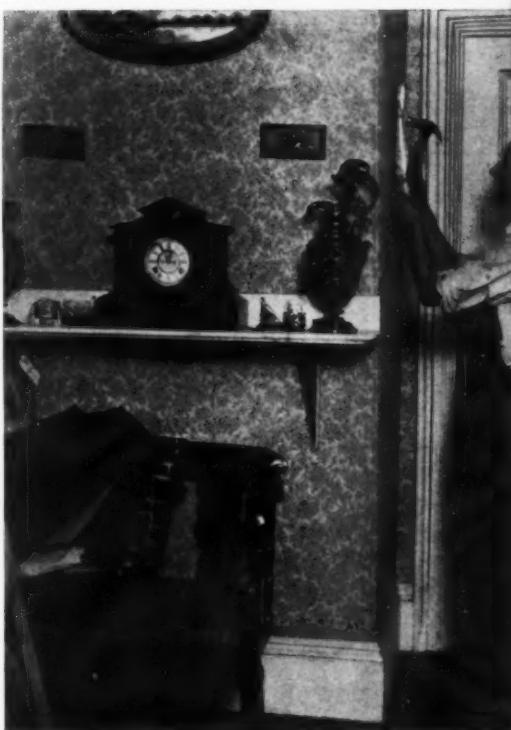
19. Before accepting each job the contractor will prepare a proposal, signed by the contractor and acknowledged by the customer, together with credit statement.

20. The utility company will satisfy itself that the wiring is to be in accordance with the required standards as to quality and adequacy and approve the project.

21. Contractor will proceed to install the wiring as specified.

22. If the job is pronounced satisfactory by the inspector, a certificate of installation or completion will be signed by the customer, contractor and inspector, indicating that the work has been completed and the installation is satisfactory. This certificate will also show the full purchase price of the installation, the amount of the monthly payments and number of months the note is to run and indicate that a minimum of 10 per cent of the cost has been paid to the contractor.

23. The customer then signs a note in favor of the contractor for an amount not to exceed 90 per cent of the total cost of the wiring installation.



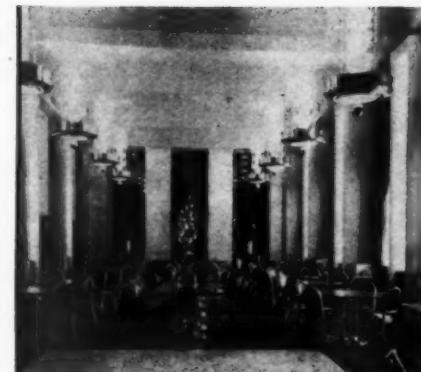
STRIKING EFFECTS in color are produced with automatic cycle control from a pilot board at the orchestra platform.

Mobile Color for DINING

MAHA's Hotel Fontenelle has long been known as one of the bright spots of the Middle West. A recent installation of Cutler Hammer automatic cycle color control in the rebuilt main dining room makes this literally true. Forty kilowatts of modern lighting were installed by the Sterling Electric Company of Omaha during the remodeling of the interior.

Remote control of the lighting system is handled from a compact portable pilot board located at the orchestra platform. The desired lighting is preset on the pilot board for either fixed color lighting or a program of changing color effects. A control switch sets the cycle in operation.

The remote cycle control permits pre-selection of an infinite variety of color sequences. After setting, the



PILOT CONTROL permits any program of color effect to be set up at the orchestra platform. Cycling is automatic unless fixed color effects are desired.



DIMMER BANK is remotely controlled from the pilot board. A master panel board is located on the opposite wall.

mechanism will continue through the preset program automatically. If fixed lighting effects are desired the cycle may be automatically stopped at the effect selected. A complete cycle runs about seven minutes with variations so gradual that there is no apparent change at any moment.

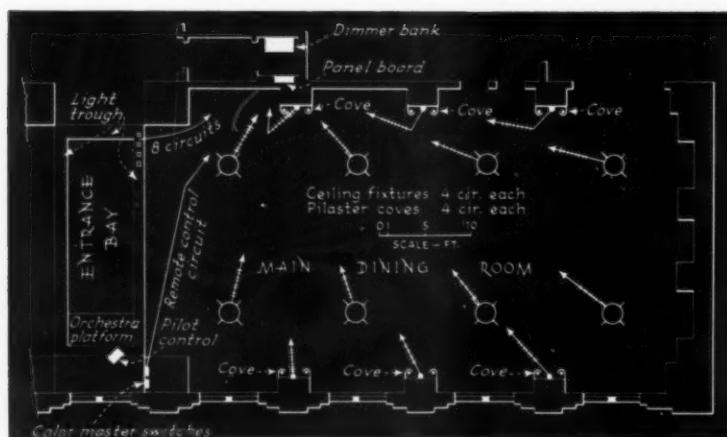
The lighting sources consist of eight modern-styled suspended ceiling fixtures and six pilaster coves extending to the ceiling at the sides of the dining room. The special ceiling fixtures are made up of chromium rods supporting a bowl and a series of five inverted cones concealing the lamps. Each fixture carries 96 lamps of 25 watts each, in four colors, red, blue, amber and white. The pilaster coves are wired for four colors with 40 lamps at each side of the strip.

Four circuits are extended from each

fixture and cove, one circuit per color, to the dimmer bank control located in a small closet off the check room. Connection with the ventilating system provides for air circulation in the dimmer room.

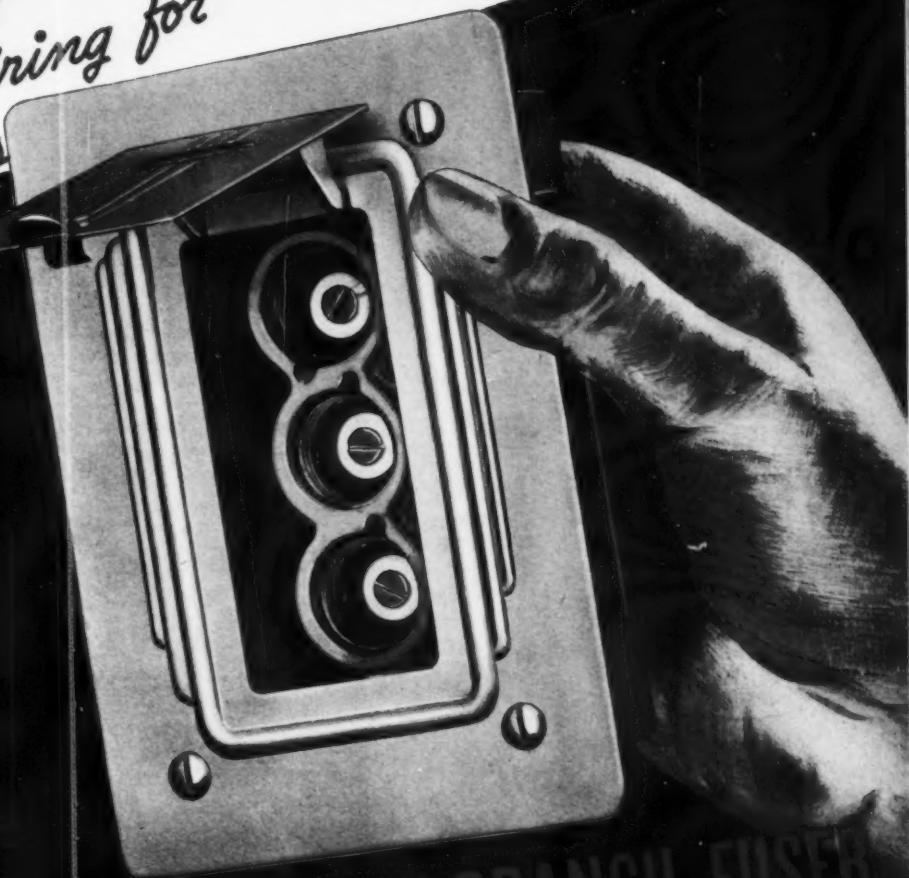
The entrance bay, extending across one end of the room between the entry and the orchestra platform is illuminated by an indirect light trough of X-ray reflectors and sockets spaced 4½ inches on centers. It is fed by light circuits from the main panelboard and controlled independent of the cycle color system.

Color master contactors in the main panelboard are operated by four push buttons in the platform wall. Sixteen-conductor flexible cables connect the pilot remote control to a wall junction box, from here the control circuits are extended to the dimmer bank in conduit.



LAYOUT PLAN shows the cycle color control circuits and location of the equipment. Color master magnetic switches are controlled by push buttons at the orchestra platform. Entrance bay lighting is independently controlled.

More Economical
and Adequate Wiring for
Low Cost Homes



THE CUTLER HAMMER TRI-BRANCH FUSER

It's New - AND THERE'S NOTHING ELSE LIKE IT!

The New Cutler-Hammer Tri-Branch Fuser was designed to fit the trend toward more economical, adequate wiring in low-cost home programs. The diagram tells the story. It gives added branch circuits, fuse-protected, for every floor on which it is used, in the most economical manner. It's a business creator and a load builder, another memorable Cutler-Hammer advance, typical of the way Cutler-Hammer meets market demand just when the demand is piling up. The Tri-Branch Fuser is in line with the trend toward greater convenience, greater attractiveness, greater economy and service. There is nothing else like it on the market today ... and that means opportunity for wide-awake men in the domestic electric field. Everybody gains with the new C-H Bulletin 4385 Tri-Branch Fuser. CUTLER-HAMMER, Inc., Pioneer Electrical Manufacturers, 1306 St. Paul Avenue, Milwaukee, Wisconsin.

CHECK THE FEATURES OF THIS BUSINESS BUILDER



1. Provides 3 fuse-protected circuits in each unit.
2. Exceptionally low cost provision for more adequate wiring.
3. Big market in homes standing and homes to be built. A load builder. Because it provides adequate wiring, it may open way to other sales.
4. Easy, economical to install.
5. Quality engineered construction. Compact, measuring only $6\frac{1}{4}'' \times 4\frac{1}{8}'' \times 2\frac{3}{4}''$. Styled cabinet, finished in aluminum.
6. Designed for flush mounting with convenient mounting bracket.
7. Size, convenience, appearance and low cost have great user appeal.

THE SUCCESS OF A COMPANY CAN ONLY REFLECT THE SUCCESS OF ITS PRODUCTS



C-H MAIN
SERVICE CONTROL

Editorials

Earl Whitehorse, Editor

And Business is Better

Business is good on the Pacific Coast and in the South. Business has improved in New England. And even around New York to Chicago, where the "Wall Street Blues" is sung so heartily, men are secretly wondering if things are really as bad as they are saying. After all, feeding, clothing and housing 129,000,000 people is a lot of business.

The signs are good. Some of the hatchets are being buried. More thought is on the job, less on politics. We're going to like this old year before it's done.

Two Cures for Motor Shop Troubles

Listen to some motor shop men and you think there is no hope because the manufacturer won't do right by little Nell. But three days at the NISA convention sounded otherwise. Here 200 motor shop operators from all over the U.S.A. talked with enthusiasm of better ways and opportunities. Stout fellas.

True, some manufacturers sell direct, where in fairness they should not. True, some transfer Class A customers to Class B, just to sweeten the bait. It's bad. But there are just two remedies—1. Organize and negotiate against it with united strength. 2. Better selling by the shops.

Who's Afraid of the Curbstoner?

In a southern city they were planning a local adequate wiring campaign. This question floored 'em for a while—"How can we create a large demand and then keep the curbstoner from cashing in on the money we spend in advertising and selling?"

The answer? It's simple. Don't match prices. Sell more complete con-

venience, comfort, capacity. Offer easy payments. Make the customer want a modern job, not want a chiselled job. You can prove it by just trying it. And it will help teach the curbstoner how to sell.

And Who is A Curbstoner?

We have hurt some feelings unintentionally now and then, by referring to the curbstoner, the small contractor, as a trouble maker. Let us explain.

God loves a small man or he wouldn't start us all that way at birth. We're for the small contractor—if he behaves; exactly as we're for the big contractor if he behaves. We're agin them if they are destructive, tearing down jobs, destroying the comfort of electric service by talking customers into ordering fewer outlets, to cut under the former bid.

The industry needs small contractors—always will. But small contractors can have big ideas—can be builders — cooperators — and make money by doing good work. That's what we mean.

You Can't Fight And Sell, Too

The biggest problem in the Adequate Wiring Campaign is not going to be to sell the public, but to get conflicting electrical ideas and purposes in harmony. When we get to selling, the public will buy. But if we get to scrapping, nobody will sell.

So this is a plea for patience—and peace. For as Father Divine says "It's wonderful!"

In setting up your local bureau, keep cool. Persist in working for the right break for the contractor, but listen to the problems of the wholesaler and the power company, too. Give and take. Have your local plan right for everybody before you start.

Kicking About Better Jobs

Back from a trip—one surprising memory lingers—the number of contractors who don't like Article 210, Section 2110 in the new Code. This is the one that requires receptacles throughout a house and plenty of 'em.

It is a drastic rule—sure. But it is logical and proper. At last, adequacy is required. It just means that we will have to explain the idea—push it. But it will make more work, better jobs. Every contractor ought to like it—not kick about it.

Inspectors Too—Some Don't Like It

An inspector writes—"Inspectors have no time to engage in promotion work on adequacy and pay little attention to it. All inspectors naturally recommend adequacy but to enforce rules is different. If he gets a reasonably safe job, it is about all anyone can expect of him."

The rule is in the book because lack of outlets brings unsafe worn cords. And having the authority, the inspector can now make the use of electricity safer for the public. All men hate changes but this is a good one. It's good for the inspector too. It gives him a bigger job.

Cash In On This One

Last year lumber industry promotion got 3000 demonstration houses built in 1204 communities. This year a bigger drive is on to build 'em up into the tens of thousands, to sell under \$5000 each. It's all tied into the government housing and financing programs and the Adequate Wiring Campaign. And some contractors will say—"What's that to me?"

Here's what. Check with your local building material people. Help them get plenty of demonstration houses in your town. See that they are well wired—that the wiring in them is well ballyhoo-ed. Cash in on this.

Now Paint 'Em Up With Light

The lamp men have sprung something big in their new fluorescent lumiline lamps. Here are new colors, more colors for decorative lighting—indoors and out—with maybe 200 times former efficiencies. And all this

with so little heat, you can paint an interior with light and not mess up the air conditioning.

The wiring for these stepped-up tubes is simple. The selling will be easy. Hotel lobbies, bars, theatres, stores, public buildings will all be wanting it. And homes will use it in coves and troughs. It means a whole new market for the contractor.

No Pills for This Spring Fever

The spring fever on wages-and-hours is raging. Just now Newark (N.J.) contractors are threatened with a \$2 scale for a 7-hour day and a 4-day work week. New York has it. Wurra, Wurra!

Some big factory jobs are hanging fire, which will require shift operations. Estimators are sweating over the problem of determining the efficiency factor for rotating crews, and for picking up work where another gang leaves off. Who said contracting was a dull business? And must we call all wiring hazardous?

What! Really Against Inspection?

Newspaper clippings from the middle west show some amazing cases, where power company officials have publicly opposed the extension of rural wiring inspection in areas served by them. REA has set up inspection on co-op projects. Farmers and public officials are naturally demanding similar protection on other power systems.

Most power companies will welcome it. All should. But one official who fights it can do a lot of harm. Certainly all contractors should work for it and unite to sell the need to any company that may be objecting.

Is This Immodest?

Maybe we should just blush and titter and say nothing. But after all—

Well, we find that Bull Dog runs a monthly "Whaddya Know Contest". In it, their salesmen about the country answer a set of questions on the Bull Dog line and wiring problems that are solved by it. We note that three winners just received, as their reward, subscriptions to this *Clarion of Liberty*, this *Fulcrum for Free Thought*, this *Whaddya Callum on Wiring*.

Now, whaddya know about that?

Better than a Houn' Dog

Men are certainly cock-eyed critters. They like to hunt and fish. Hunting means walking to hell and gone on tired feet, cursing a flea bitten dog and beating bushes. Fishing means wading in cold water, standing numb on a bank waiting and wondering. They love it.

But how about selling? Business hides too. Yet if you go where you know it ought to be, it's there. And the same kind of energy and patience puts it in the bag.

Selling is the greatest sport of all—with plenty of good houn' dogs to help. Now why can't we all get the sporting angle on it?

Back Talk

More Hurt Feelings And We're Sorry!

To the Editor—In my work I have made use of many a short cut and new method, brought to my attention by articles in *Electrical Contracting*. It's the best magazine of its kind I have ever seen.

May I say a word about your crusade against the price cutting, slip-shod, electrician? It's a great cause you're fighting for, but—please make it plain that you're against poor workmanship and unfair price cutting, and not against a guy just because he's a little fellow.

Please, mister, it ain't no sin to be little. Give us a chance to grow up.

Lewis F. Brown,
Solvay, N. Y.

Dear friend, you put your finger on it. And that's just what we mean. Poor workmanship and unfair price cutting—that hurts every other contractor, every electrical man—and is unfair to the public. And Honest to God! you must not get your feelings hurt at what we say. There's nothing snooty about this paper. If so, point it out and we will take the veil.

Comments on our "Customers' Layout Sheet"

In March we recommended to the electrical contracting industry the use of three suggested forms, a Customer's Layout Sheet, a simple Proposal and Specification Form and a Furniture Cutout Sheet, to help sell wiring to old and new homes. Some forty contractors have so far sent in orders for these forms. They are trying them out. We also sent samples to power companies, manufacturers, wholesalers to see what they thought of the idea. Here are some interesting comments—

1. "We agree that the use of "Customer's Layout Sheet" is of value in the promotion of adequate or comfort wiring. The form will arouse questions and produce increased business for the contracting industry. We will do our part to bring it to the attention of contractors."—H. P. J. Steinmetz, Vice President, Public Service Electric & Gas Company, Newark.

2. "We have reviewed this data with interest and consider the plan all right with the possibility of its being very effective, if you can induce the contractor to put it into effect."—H. N. Pye, Chief Engineer, South-Eastern Underwriters Association, Atlanta.

3. "I agree with you that the problem of adequate wiring is a pressing one, and I am impressed with your plan. If followed up properly with the trade, it should contribute much to its success."—A. W. Robertson, Chairman, Westinghouse Electric & Manufacturing Company, Pittsburgh.

4. "I am pleased to acknowledge another one of your splendid contributions to the adequate wiring of homes in America. You are certainly doing a splendid job through your valuable publication in bringing home to your readers the simplest method by which they can achieve a higher degree of adequate wiring in the residential field."

"Never at any other time in my experience has there been manifest so great a desire on the part of electrical contractors to cooperate with the other branches of the industry in an effort to promote better and more adequate wiring of every description. The contractors are enthusiastic in their praise of progress now underway. The rest of the industry cannot afford to overlook a single bit which will tend to keep this enthusiasm at a permanent high peak."—L. E. Latham, Vice President, E. B. Latham & Company, New York.

5. "I think the editorial is fine. It ought to be helpful and it is indeed timely. I have examined with much interest the check sheet, proposal and specification form which you are proposing the contractors use, and I think they are splendid."—Charles E. Wilson, Executive Vice President, General Electric Company, New York.

6. "This is a splendid idea. I am going to discuss these with the League Manager and other interested parties, and it may be that this is just what we have been looking for to furnish the wiring contractor, for use in selling wiring. All we ask is that you keep up your good work, and I am sure this national wiring situation is going to improve."—W. A. Hawkins, Sales Manager, Utah Power & Light Company, Salt Lake City.

7. "I like your editorial "Slick as a Zipper!" and I like your whole idea. The proposition is also being considered by the Plan Committee of the Adequate Wiring Bureau."—W. E. Sprackling, Vice President, Anaconda Wire & Cable Company, New York.

8. "Your plan, in my opinion, is of great merit, and ties in exactly with our own activities in this respect. Mr. Lewis has arranged for the members of the Denver Contractors Association to bring up your project for consideration at its next meeting. The plan also will be discussed, meanwhile, with members of the League, of which the Contractors' organization is a unit."—G. B. Buck, Commercial Manager, Public Service Co., Denver.

9. "The suggestion made by you is, in my opinion, very sound—I believe that many of the better class contractors will use this idea and it will be very workable."—J. L. Busey, President, General Electric Supply Corporation, Bridgeport.

10. "If your suggestion were generally adopted, I feel sure it would do more than almost anything else to help the adequate wiring program. Again I want to congratulate you on the constructive work you are doing."—C. L. Peirce, Jr., President, Hubbard & Company, Pittsburgh.

We Don't Mean It That Way

To the Editor—I have been a subscriber to your magazine for a good many years and often thought of never renewing my subscription. I am one of the boys who don't employ help and work from my home. So I hope you will take it easy on us in your editorials.

Henry Feit,
Brooklyn, N. Y.

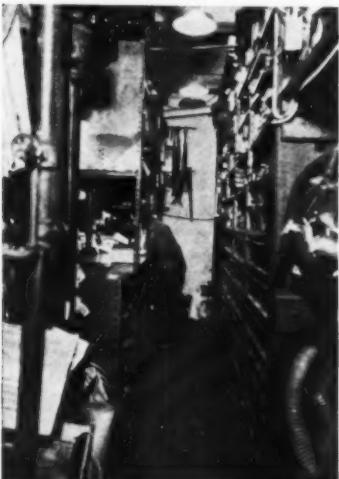
As we wrote to Brown, we don't mean it that way. It isn't how much work a man does, but how he does it. Work for the customer's good. Don't talk him out of comfort, to make the job cheap, and we are for you. Small business men are the foundation of every industry.

WIRING Methods

STOCKING UP FOR INDUSTRIALS

The varied requirements of industrial wiring and modernization materials necessitates plenty of bin and drawer space at the Davidson Electric Company, Brooklyn. Here is one of the aisles where small fittings, wiring devices, bolts, screws and anchors, and other everyday items are stored in sectional steel shelving. Pressed steel "tote" trays are used in the six bottom tiers.

The stockroom clerk holds forth in

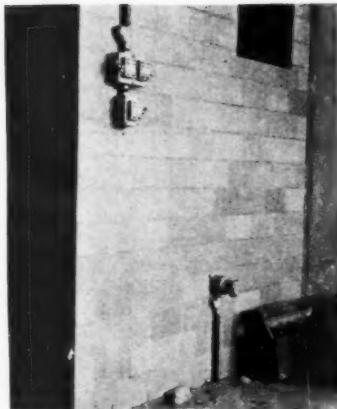


ORDER DEPARTMENT—An aisle in the stockroom of an industrial contractor's headquarters.

the left background, where the flat steel-top shelf provides a waist-high desk. Orders are taken here by phone from jobs and written up. Stock moves from the various aisles to a truck loading entrance at the rear.

BRASS FLOOR COUPLINGS

Explosion proof fittings and conduits in the operating rooms of the new Indianapolis Clinic building are installed exposed on the partitions to facilitate



EXPOSED SWITCHES—And receptacles are wired in conduit from brass floor couplings set flush in the floor and ceiling for convenient alterations.

alterations. At the points where conduits extend from the floors and ceilings flush brass floor couplings were installed by the C. L. Smith Electric Company of Indianapolis, Ind.

The exposed portions of the conduit system may be quickly removed and the floor couplings capped flush when changes are made in the partition layout.

FOLLOW-UP ON WIRING JOBS GETS EXTRA SALES

Follow-up calls made 30 to 60 days after a job is completed net extra sales for the Zach Rudo Electric Company of Baltimore.

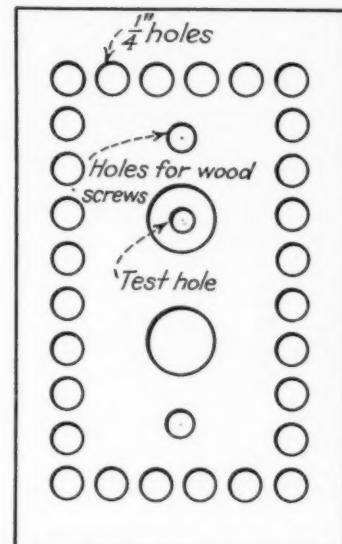
"Every customer is a follow-up prospect," says Mr. Rudo. "He may economize too closely on the original job and discover he cannot get along without the conveniences he eliminated. Or perhaps his improved electric service sells him on further conveniences. So even though we only install a new outlet, we make a follow-up call just the same. The results on these calls are consistent even though the jobs are not usually large."

"This follow-up is made under the guise of an inspection call. A checkup

is made and the customer usually gives a hint of further needs in his conversation with our representative. We find that the new business derived from this promotion is well worth the trouble and instances are not infrequent, where a call-back on a small job lands a large one. We make the follow-up call from 30 to 60 days after the original job because it gives the customer time to appreciate his new service and to consider new conveniences. It also often happens that a customer who economized too closely the first time is in a position to finance additional work more easily after a month or two have passed."

SWITCH BOX TEMPLATE FOR OLD WORK

Gust Gustavson, of Two Harbors, Mich., uses a drill and a standard brass switch plate as a template to cut neat openings for switch boxes. A switch plate, which has $\frac{1}{4}$ -in. holes drilled to match the rectangular outline of a switchbox is first screwed to the wall or baseboard where an outlet is wanted. A quick and clean-cut job may then be done with an electric drill that requires little trimming of the opening. By reversing the bevelled template the



Brass plate back side out

BOX TEMPLATE—Brass switch plate screwed to wall as template for cutting box holes with electric drill.

drill is not so apt to slip off the plate and mar walls or woodwork.

The push button holes in the template are used for drilling "test" holes to locate the position of laths or studs, after which the template is shifted for the final drilling operation.

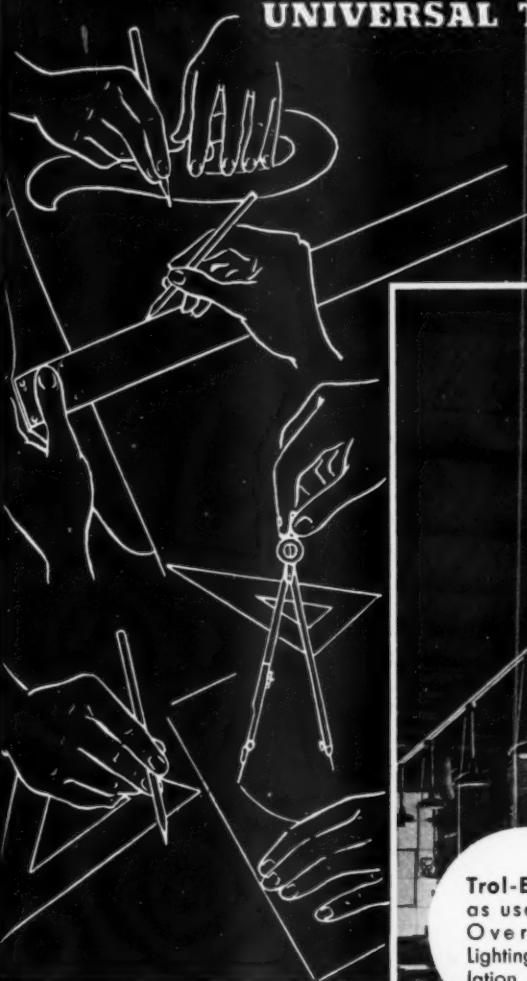
FOR FLEXIBLE LIGHT AND POWER CIRCUITS

You Can Get BULL DOG

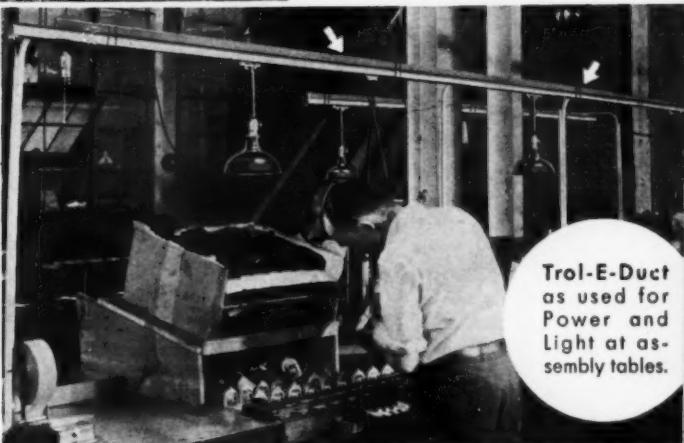
UNIVERSAL TYPE

Trol-E-Duct

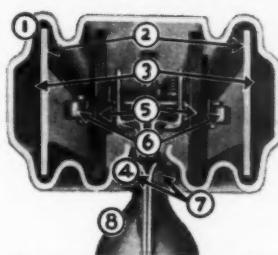
"TAILOR MADE"



Trol-E-Duct
as used for
Overhead
Lighting instal-
lation.



Trol-E-Duct
as used for
Power and
Light at as-
sembly tables.



Cross sectional view of Mov-
able TROLLEY inserted in Duct

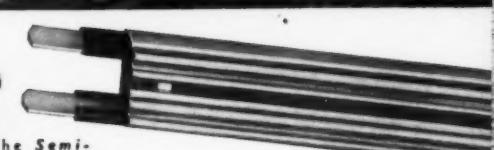
1. Formed Steel Duct
2. Copper Busbar
3. Insulation
4. Duct Opening
5. Trolley Wheels
6. Current Collectors
7. Guide Rollers
8. Trolley Housing



The Movable
TROLLEY
which, with its
connected
load, can be
moved along
the Duct run.



The Semi-
Fixed Twis-
tout PLUG
which with its
connected Load,
can be plugged
in at any point
in the Duct.



THE SLOTTED ELECTRICAL DUCT . . .
in which the MOVABLE TROLLEYS and Semi-Fixed
TWISTOUT PLUGS are inserted . . . Every inch
of this DUCT is a Potential Electrical Outlet.



BULL DOG ELECTRIC PRODUCTS COMPANY

Pioneers of Flexible Electrical Distribution Systems

DETROIT, MICHIGAN

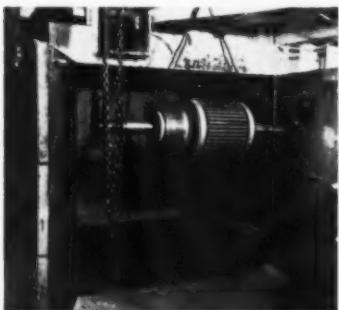
BULL DOG ELECTRIC PRODUCTS OF CANADA, LTD., TORONTO, ONT.

Motor Shops

READY TO HEAT

Going into the oven for preheating, this armature is for a 30 h.p., 230-V, d.c. P & H crane motor, which was rewound and the commutator rebuilt in the service shop of I. R. Nelson Co. Inc., Newark, N. J. After preheating has removed all moisture from the new windings and slot insulation, this armature will be dipped in Harvel black baking varnish and given a slow baking.

In this company's shop layout the large oven is in the basement below



BAKERY FLOOR—Oven below main shop floor where heavy items are hoisted through trap door for dipping, baking. In the heavy apparatus repair shop. Equipment is lowered by hoist through a trap door when ready for preheating or dipping.

SAVING THE FINISH

When repaired armatures come through the works all bright and glossy, at the Electric Maintenance Company of Boston, a little extra touch of precaution saves this finished appearance. Heavy kraft paper is wrapped around the armature, including corrugated paper pads around the commutator. This method is of most benefit, where the customer does not put the repaired armature into service, but holds it in stock as a spare. When the time comes to use it, the job is clean as new, free of soot or gritty



KEPT NEW—Rebuilt armatures wrapped to exclude soot and grit until customer puts them into service.

particles, and ready to go.

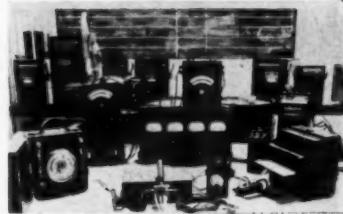
In the foreground is a 40 h.p. "packaged" armature for an 800 rpm elevator motor. The smaller one is for a 32-volt Pullman car motor.

NOISE TEST

This sound-proof room is used for testing special motors with a decibel meter, at the new Westinghouse motor aisle. A shaft extends through the acoustic-insulated wall in the background for driving a machine to simulate actual operating conditions. The driven machine is thus kept out of the room to isolate its noise from the motor under test.



SOUND PROOF—Motor noise tests made in sound proof room with decibel meter show up what's wrong.



FIELD EQUIPMENT—With heavy industrials and oil field motors to service, the R. A. Reed Electric Company of Los Angeles maintains a complete assortment of instruments for its field engineers. Here are a few that were in the shop when the photographer dropped in.

COMPACT LINE AND HIGH-POT TESTS

A right-angle panel arrangement forming a screened hollow square, keeps high-potential and low voltage testing equipment compact and safe from apparatus being shoved into the rear connections, at the S. J. O'Brien Sales Corp., New York. The right panel provides facilities for testing d.c. and 1, 2 and 3-phase a.c. motors below 600 volts. The left panel takes care of



COMPACT TEST BOARD forms a hollow square enclosure for rear connections.

high-potential tests of 0/1500 or 0/3000 volts range. The rear-mounted transformers have voltage adjustments by means of a radial lever control. This lever has a magnetic trip and spring device which causes the lever to return to the off-voltage position, if a high voltage test breaks through the winding being tested.

SLIPKNOT BROWN

The Newest Thing in Tape



means
**MODERN
ELECTRICAL
WORK**

***Be the first in your
community to use it!***

When you use "SLIPKNOT BROWN" on the job, it's a sign to the world at large that you are keeping abreast with new developments—using the latest and finest equipment and supplies.

"SLIPKNOT BROWN" is *new*—*different*—and *better*, because it's the natural color of raw rubber smoked sheets. Fresh, pure rubber comes directly from the plantation and is worked into the finest fabric. The high content of this raw brown rubber assures lasting strength and adhesion.

"SLIPKNOT BROWN" introduces a new era in friction tape. Keep pace with progress. On your next job, "do it up brown"!

Sold Through Wholesalers Only

PLYMOUTH RUBBER COMPANY, INC.

CANTON • MASSACHUSETTS



Better Lighting

BIG STORE TRIES NEW LIGHT TREATMENT

Wieboldt's "world's largest suburban department store", recently opened in the Oak Park shopping section of Chicago, presents what architects consider one of the most significant steps yet observed in the new "classical age" of commercial construction.

"Opened up" wall areas of Insulux glass block provide greatly increased daylight to assist shoppers in their selection of goods, a much more effective display of merchandise and a novel decoration scheme. It also assists in temperature control for this air-conditioned building.

Breaking with traditional large store design, Wieboldt's great structure designed by Holabird & Root, Chicago, features long panels of glass block. Each of the two horizontal bands of block are $5\frac{1}{2}$ feet wide, creating an unusually striking effect. At the rounded corner of the main entrance, glass block extends from above the marquee almost to the roof, and at night, with interior illumination, the building is a glowing structure of striking beauty.

By using concealed bulbs in a kaleidoscopic variety of colors, the management, if it chooses, can take advantage of the translucent glass block walls, changing the night color scheme at will—red, white and blue for the Fourth of July, all green for St. Patrick's Day, reds and greens for Christmas. A color tie-up for any occasion.



SMART MERCHANDISING—New Chicago store uses illuminated glass blocks for day light and night color effects.

26

SPORTS ARENA WELL LIGHTED

The new million dollar Hockey and Sports Arena in Cleveland has some interesting electrical features. A battery of thirty-six 1500-watt deep bowl reflectors centered 21 feet apart and about 35 feet above the ice surface provides even illumination over the ring proper. Lighting for the prize ring, or other events requiring concentrated brilliance,

SPORTS LIGHTING
Cleveland's new million dollar arena has lighting facilities for hockey, boxing and special theatrical needs.

The scoreboard in the Hockey Arena is suspended midway between ice and ceiling in the center of the ring. The 1½-ton glass and chromium indicator has time dials and scores on all four sides. It is illuminated by 48 lights, with 72 additional bulbs to flash numbers of players penalized, and to give other information.

Eighty-five wires connect with a remote control board located in the press box. Chimes ring at the end of each period, and a battery of ten loud speakers, arranged in a circle above the board, is the main unit of the address system.

The scoreboard has been arranged for use both during hockey games and boxing matches. The automatic timing device is equipped with two dials, the inner for length of rounds, and the outer for duration of hockey periods. Figures indicating penalties are also used for showing how far a fight has progressed. Electrical work was installed by the Harrington Electric Co. Gillmore-Carmichael-Olson Co. was the general contractor.



SODIUM LAMPS ADOPTED BY INDUSTRIALS

The high efficiency and low brilliance of sodium lamps is being applied to safeguard men, equipment and materials from injury and loss during night work in the yards of industrial plants, roads, docks, parking lots and other outdoor areas. Installations have been made in the yards of such plants as: Bethlehem Steel Co., Lackawanna, N. Y., and Bethlehem, Pa.; American Rolling Mill Co., Ashland, Ky.; Chrysler Corporation and Chrysler De Soto Division, Detroit, Mich.; and the Puget Sound Navy Yard, Bremerton, Wash.

The sodium lamp has a light output about equal to that of a 500-watt incandescent lamp, with an overall consumption of only about 255 watts. This higher efficiency is significant when lights are to be used all night.

Electrical Contracting, June 1938



WHAT! A Contractor who says the Low Bid *Too Expensive!*

The smart electrical contractor is the one who can prove that the low bid may actually be the most expensive, and who can back it up with facts.

Contractors who know their stuff realize that Westinghouse Nofuze equipment costs little more—sometimes even less than ordinary circuit protection. And it gives them the selling points, the straight

facts, that can't be squeezed.

Nofuze switchboards and panelboards pay the owner dividends every year. They save a substantial amount in the current consumed by the units themselves. They save unnecessary service interruptions. They banish costly losses of time by employees operating electrical equipment. And they are absolutely safe and

tamperproof, identifying the contractor who installs them with the highest quality electrical work.

Westinghouse Nofuze Equipment is designed to protect circuits from 15 to 600 amperes, from 115 to 600 volts, A-C and 115 to 250 volts, D-C. Send for the Westinghouse Nofuze chart that tells where and how Nofuze equipment may be installed.

WESTINGHOUSE ELECTRIC & MANUFACTURING CO., EAST PITTSBURGH, PA.

J 60207



Westinghouse

NO FUZE MULTI-BREAKERS

Questions Code ON THE Code

Answered by
F. N. M. SQUIRES

Chief Inspector New York Board of Fire Underwriters

Common Neutral

Q. "Suppose I wish to take three lighting branch circuits from a 110/220-3 wire solid neutral fuse cabinet and run them through the same conduit for say, 30 or 40 feet before I get to the lighting outlets. May I use the same neutral wire for all three circuits? Is the size determined by the maximum possible unbalance? If so, what happens if these three circuits happen to be taken off of the same side of the 110/220-3 wire cabinet?"—A. C. B.

A. Section 2113 permits the use of a common neutral provided the conductor is of sufficient size. The neutral must be large enough to carry the maximum possible unbalanced load. If three two wire circuits are taken off the same side of a 3 wire single phase or d.c. current, the common neutral will have to carry the sum of all three circuits. That is, if each circuit is of 15 amps., the neutral will have to be large enough for $3 \times 15 = 45$ amps. or No. 6 wire.

Sheathed Cable Out of Doors

Q. "Is Romex painted with weather proof paint permitted coming out of a building? This has been practiced in this State for a number of years. It has also been used to put switches on poles in yards. Do you think this should be discontinued?"—F. G. F.

A. Non-metallic sheathed cable was never intended for use out of doors. It is not made with such use in mind, nor has it been approved with

this use in view. This type of cable was intended only for interior use in dry locations. It is not saturated with the proper moisture repellent to make it suitable for use out of doors.

The saturant generally used with non-metallic sheathed cable is of the order of parafine which "migrates" or evaporates with exposure to air and warmth thus making the outer coverings absorbent. The National Electrical Code is not sufficiently definite on this subject but implies that it is not to be used where subject to moisture and does not contain a definite statement.

Its use for outside wiring certainly should be discontinued.

Changed Supply System

Q. "There is to be an electric range installed in an old house. The wiring in this house has not been polarized. There is to be a new three wire entrance installed. The entrance switch is a combination of meter and branch circuits for the range and lights with a solid neutral.

Would it be permissible to connect the lighting circuits to the single fuse cutouts, without polarizing all of the old wiring? Or would the old branch circuits have to be fused in both wires?"—R. T. P.

A. In this case a house previously wired and equipped for connection to a certain kind of supply system is now to have a new service and to be connected to a different kind of supply system. Naturally, the old equipment should be brought into conformity with the conditions required for the new service, or, at least into some de-

gree of conformity with those conditions.

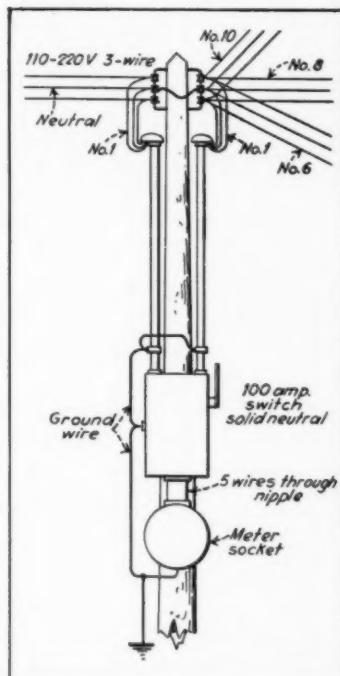
This would not be difficult nor costly as probably two changes to the old equipment would, in most cases be sufficient. These changes would be: First take out the fuses in the neutrals of the old wiring. Second, polarize all of the lamp holders (sockets) on the fixtures. In some cases, this would leave one condition which, should be remedied, that is one more troublesome and more costly. It is also one which might be overlooked, as not presenting serious hazards. This is the leaving of switches in the grounded conductors of the branch circuits.

With these conditions taken care of there should be no hesitancy about connecting the old equipment to a new 3 wire service.

Pole Hook-Up

Q. "What's wrong in this sketch and how much?"—A.C.B.

A. The items that are wrong in the illustration below are—
The No. 10, No. 8 and No. 6 wires



PROTECTION NEEDED—These pole-top service taps are code violations.

should be No. 1 wires, as the service fuses are 100-amps. Or individual fuses must be provided to protect the smaller wires. The neutral jumper at the top of the pole should be removed.

This NEW Synchronous
TIME-SWITCH

will not stop...



...because the 10 hour carryover
feature of **SANGAMO FORM VSW**
assures continued service.

The Model B Forms VSW and VSWZ Time-Switches combine the advantages of synchronous timing with reserve spring clock operation, providing continuous operation during current interruptions up to ten hours. An entirely automatic carryover eliminates the necessity of resetting the dial after the electric service has been restored. Supplied with standard or astronomic dial.

DETAIL DESCRIPTION ON REQUEST

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ILLINOIS

PRESERVATION OF EYESIGHT IS THE IMPORTANT PART OF YOUR JOB!

"Let Us Help You"

*Efficient Widespread Lighting Plus a
New Luminous Effect with Denax Glass
A SHOWER OF ILLUMINATION WITHOUT GLARE*

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CHECK THESE FACTS

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Streamlined Design

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Art metal distributors everywhere will be glad to give you an actual lighting demonstration.



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Write for Complete Catalog of Modern Lighting Ideas

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•

Cleveland, Ohio

SMALL MOTOR REPAIRS

[FROM PAGE 16]

saves many motors and gives a good idea of what is going on in the machine itself.

There is a good deal of business to be obtained where these inspections are carried on because the company making the inspection is always familiar with the plant and should have first chance at any repairs. The inspection charge should be as low as is consistent with a good inspection.

Plant owners should be cautioned against accepting what is commonly called cheap work, or that which is done by people of less experience. While repair bills are most distasteful to a plant operator, on the other hand, if a machine is not put back into condition practically as good as when it was new, then the repairs and the bill become expensive.

Many plants carry insurance on their electrical apparatus against destruction from any cause which would put it out of commission other than from an external fire. The inspectors for the insurance company are not allowed to make adjustments or repairs of any kind. They report their findings to the proper authority whose business it is to take care of having repairs or adjustments made. It is advisable to work with these insurance companies as they can be of vast assistance, putting work in your shop when they have confidence in your ability to do the job well.

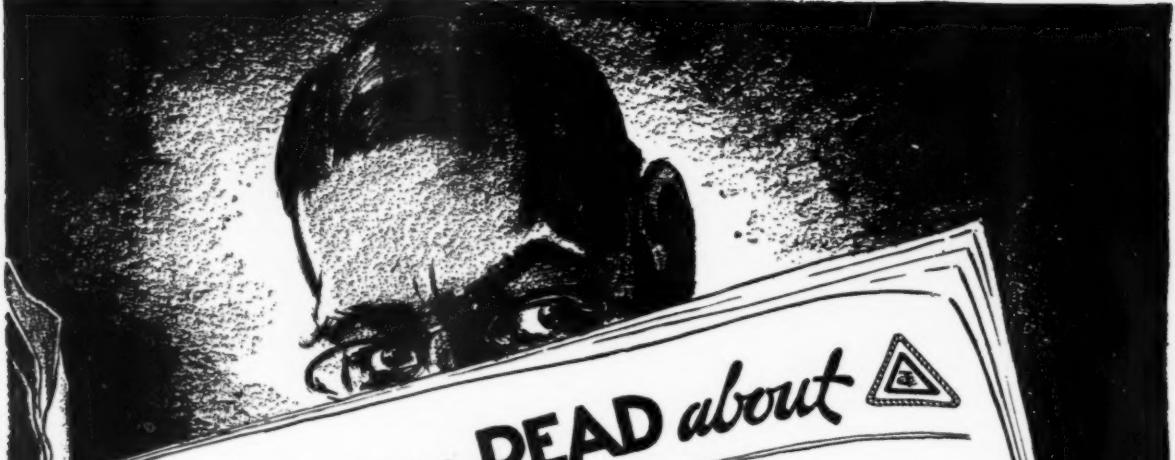
It is also of interest to know that the insurance companies do not recommend the carrying of insurance on small motors. This means from 5 hp. down, because the cost of making the repairs or rewinds is usually less in the final analysis than would be the cost of the insurance itself. So you will not find them seriously interfering with an inspection contract where a plant is equipped with a lot of little motors.



**PANTHER DRAGON
TAPES**

HAZARD INSULATED WIRE WORKS
A DIVISION OF THE ORKONITE CO.
WORKS, WILKES-BARRE, PENNSYLVANIA

New York Chicago Philadelphia Atlanta Seattle Dallas Washington Pittsburgh Buffalo Boston Detroit
San Francisco St. Louis Los Angeles



The jobs you READ about



FOR SAFE ARTERIES of Traffic—or Electricity!

Another job on which THE CONTRACTOR WAS
SAFE because HE SPECIFIED TRIANGLE

TRIANGLE PRODUCTS REWARD BUYERS!

TRIANGLE CONDUIT & CABLE CO., Inc.
Horace Harding and Queens Blvds.
ELMHURST, NEW YORK CITY, N. Y.



It MUST be right!

NEXT ISSUE
ALAMEDA COUNTY
COURTHOUSE
OAKLAND, CALIF.

HOW MUCH CAN YOU REMEMBER?

THERE is no better measure of a man's knowledge than to review a series of background articles like this and see what has been forgotten. For every one's work gets in a rut and his memory follows after. The first thing he knows he has lost his confidence, when some problem pops up that calls for sure fire action.

That's what this "Check Up of Maintenance Practice" is for. These Guide Sheets cover quickly the elementary facts on electrical equipment that every maintenance man must have at his command, if he is to do a good job and be ready for a better one.

This series of articles began in January with a frank review of the electrical maintenance man's job. Then came—

1. ALTERNATING CURRENT MOTORS—Types and Applications
2. DIRECT CURRENT MOTORS—Types and Applications
3. ALTERNATING CURRENT MOTORS—Maintenance
4. DIRECT CURRENT MOTORS—Maintenance
5. A.C. MOTOR STARTERS AND CONTROLLERS—Types and Applications (this issue)

Coming articles will discuss—

6. D.C. MOTOR STARTERS AND CONTROLLERS—Types and Applications
7. MAINTENANCE OF CONTROL EQUIPMENT
8. SPECIAL CONTROL PROBLEMS—Heavy Installations and their Maintenance
9. ELECTRIC DISTRIBUTION—Circuit protection—Power Factor Correction
10. LIGHTING—Applications
11. ELECTRIC HEAT—Types, Applications and Maintenance
12. ELECTRIC WELDING—Types, Applications, Control
13. INTERPLANT COMMUNICATION—Types and Common Maintenance Problems
14. INSTRUMENTS—Types, Application, Care
15. POWER TOOLS AND APPLIANCES—Types, Application, Care
16. BATTERIES AND RECTIFIERS—Types and Maintenance
17. ELECTROPLATING—Maintenance Aspects
18. ELECTRONIC DEVICES—Types and Applications

Maintenance

CONTROLLERS FOR A.C. MOTORS —Types and Applications

THIS discussion is to serve as a review to aid the electrical maintenance man in the selection of a.c. controllers, and to assist him in keeping the plant running. It will be limited to control for motors rated up to 500 hp., sizes most commonly used in industrial plants, commercial and office buildings and institutions.

Maintenance of control, and special applications for heavy installations such as steel mills, mine hoists and the like, will be discussed in this same section in subsequent issues.

Types of Controllers

Electric controllers may be divided into three types—*manual*, *semi-magnetic*, and *full-magnetic*. The following definitions, adopted by the National Electrical Manufacturers Association (NEMA), represent standardized practice in the United States.

Manual type—Controller having all of its basic functions performed by hand. By "basic functions" is usually meant line closing, acceleration, retardation, and reversing.

Semi-magnetic type—Controller having part of its basic functions performed by electro-magnets, and part by other means.

Full-magnetic type—Controller having all of its basic functions performed by electro-magnets.

Manual control—Permits regulation of machines from only one position, but has the advantage of low first cost. However, it is limited in size and capacity.

Magnetic control—Here the power circuits to the motor are closed and opened by magnetic contactors. The contactors are controlled by a pilot device which has small current capacity.

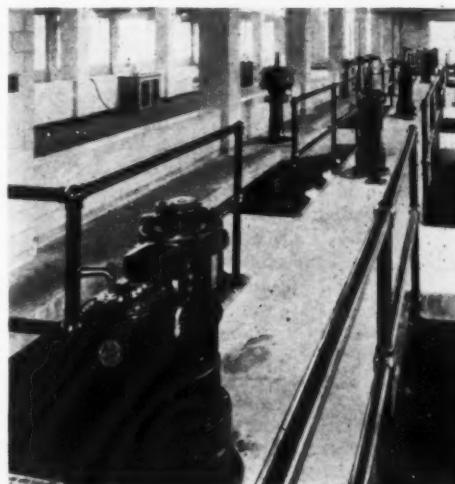
The pilot device may be manually operated, by push button or master switch or it may be automatically operated by a float switch or thermostat.

Principal uses of magnetic controllers are—

- (1) For smooth acceleration, retardation and reversing of motors without damage to the motor;
- (2) For control of a motor from one or more stations;
- (3) For automatic control where an attendant is not present;
- (4) For operation of a motor at a distant point;
- (5) For operation of high voltage equipment;
- (6) For conservation of space by locating the controller in an out-of-the-way place and operating it by a pilot device.

Manual and magnetic controllers

DRUM CONTROLLERS permit smooth starting of wound rotor induction motors driving agitators in a municipal waterworks. (Allen-Bradley photo)





FINGER-TIP CONTROL for an a.c. motor which drives a shear in a sheet-metal stamping plant. Full voltage starter is completely enclosed, and to its right is a safety type disconnecting switch. Start and stop push buttons are accessible for operator. (Westinghouse Photo.)

may both be designed for starting a.c. motors on full voltage or on reduced voltage—

Full-voltage controllers impress line voltage on the motor terminals at starting. They are usually known as "across-the-line starters" or "line starters."

Reduced-voltage controllers at first, impress less than line voltage on the motor terminals when starting, and by one or more steps, increase the voltage on the motor terminals to full line voltage.

The Voltage Factor

The correct controller for any installation is determined not only by the type and size of motor, but by the functions to be performed by the controller, the load and the line characteristics. Starting of motors on line voltage or reduced voltage depends upon circuit conditions and the machine to be driven. If full-voltage starting imposes too large a load or causes a disturbance on the power lines, reduced-voltage controllers should be used.

Full-voltage controllers manually operated, are generally limited to single-phase and squirrel-cage motors up to $7\frac{1}{2}$ hp. The magnetic controller may be used to start large squirrel cage or synchronous motors on full voltage, depending on conditions such as local regulations, motor application and motor design.

When "line starters" are used, motors will develop a starting torque from 175 to 400 per cent of full-load

torque, depending on the type, size, and speed of motor. The inrush or starting current may be as much as 650 per cent of full load current. This heavy line current, with temporary reduction in line voltage, may be objectionable.

Reduced-voltage controllers either manual or magnetic, are connected in the line or primary circuit and used to reduce starting or inrush current peaks to satisfactory values. Reduced voltage can be obtained in three ways—by using an auto-transformer, a resistor or a reactance.

The auto-transformer starter, commonly known as a compensator, is used with squirrel-cage motors, $7\frac{1}{2}$ hp. and larger. It usually has two auto-transformer coils, connected open delta, and provided with taps to give starting voltages of 80, 65 and 50 per cent of line voltage. The 65 per cent taps are generally used. With this starter, a comparatively low current is drawn from the supply lines. A disadvantage is the complete loss of power at the motor terminals, when the motor is disconnected from the transformer taps and transferred to the power lines. The result is a second current peak which is objectionable if the transfer is not made quickly.

Magnetically operated compensators are used throughout some plants, so that the motors will always be started properly. For 2,200-volt circuits and higher, oil switches are used for starting and running.

The primary-resistance starter connects the motor to the line through a resistor. At starting, all the current

to the motor passes through the starting resistor. As the motor accelerates the current decreases, voltage drop on the resistor decreases and the motor terminal voltage increases. The automatic increase in voltage at the motor terminals aids acceleration.

The motor and the line currents are equal. For a given voltage at the motor terminals, the motor current will be the same but the line current will be higher than it would be if an auto-transformer were used.

There is no open-circuit. Therefore, this type provides smoother acceleration than the auto-transformer type starter.

The reactance starter has similar circuits to those of the resistance type, and the advantages and disadvantages are the same. It is more expensive, but is smaller in size than the resistance type—especially for large motors where it is used most frequently.

Motor Requirements

The selection of controllers also varies as applied to squirrel cage, synchronous and wound-rotor induction motors.

Polyphase squirrel cage induction motors, about $7\frac{1}{2}$ h.p. and larger, usually require a reduced-voltage starter. Current drawn from the line and torque required to start the motor and its load must be considered.

Starting current of a squirrel cage motor varies almost directly with the voltage. The starting torque varies as the square of the applied voltage. Therefore, when the voltage is reduced 50 per cent, the starting torque is reduced to 25 per cent, the starting current to 50 per cent.

Control of multi-speed squirrel cage motors up to about $7\frac{1}{2}$ hp. may be obtained with drum switches. These change the number of poles on the motor and consequently change the speed.

With magnetic controllers, the multi-speed motors can be started on any speed by pressing the correct push button. They can be furnished for automatic-sequence starting or for starting at the lowest speed.

Synchronous-motor starters are about the same as those for squirrel-cage motors, except that d.c. field control is included. When the motor is up to about 90 per cent speed, the field is automatically disconnected from the field discharge resistor and connected to the d.c. supply. Excitation of the field pulls the rotor up to synchronous speed and locks it into step with the rotating field of the stator.

A wound-rotor induction motor requires resistance in the rotor or secondary circuit for starting or speed regulation. Secondary resistance makes it possible to start the motor, without taking much more current from the line than is required to drive full load at full speed, and with much less line disturbance than is possible with a squirrel cage motor. Maximum torque can be made available by proper selection of secondary resistance. Starting torque is practically proportional to the line current, in per cent of full-load conditions.

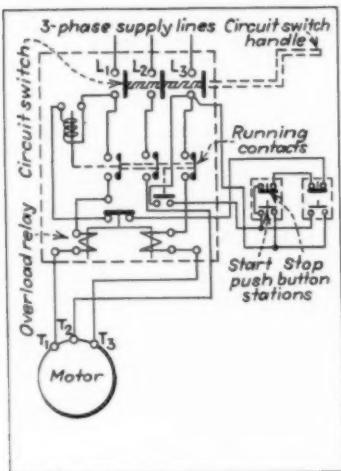
A primary switch, manual or magnetic type, is used to connect the stator terminals of a wound rotor motor to the supply line at full voltage. It should be interlocked

SELECTION CHART FOR A. C. MOTOR CONTROLLERS

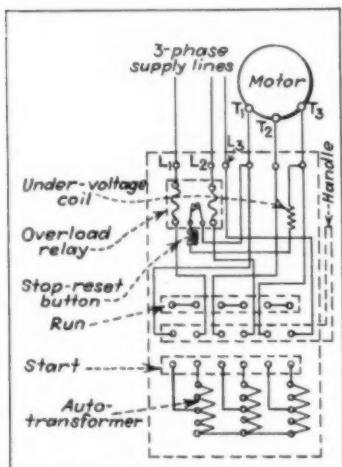
TYPE OF MOTOR	FOR MANUAL CONTROL			FOR MAGNETIC CONTROL (Remote Pushbutton Operation)*		
	NON-REVERSING	REVERSING	NON-REVERSING	ACROSS-THE-LINE STARTING (With OL and LV Protection)		REVERSING
Across-the-Line Starting (With OL Protection)	Reduced Voltage Starting (With LV Protection)	Speed Adjustment Across-the-Line Starting (With LV Protection)	No	Drum Switch up to 15 hp.	No	Reduced Voltage Starting Line and LV Protection (With OL and LV Protection)
Squirrel Cage General Purpose Normal starting torque Normal starting current	Manual starter up to 7½ hp. Generally toggle type, quick acting	(1) Auto-transformer former starter with OL Protection. (2) Linestarter with OL Protection, and Primary Rheostat	No	Drum switch up to 15 hp.	Linestarter	Across-the-Line Starting Line and LV Protection (With OL and LV Protection)
Squirrel cage Normal starting torque Low starting current	Manual starter up to 7½ hp. Generally toggle type, quick acting	(1) Auto-transformer former starter with OL Protection. (2) Linestarter with OL Protection, and Primary Rheostat	No	Drum switch up to 15 hp.	Linestarter	Across-the-Line Starting Line and LV Protection (With OL and LV Protection)
Squirrel cage High starting torque up to 7½ hp. Generally toggle type, quick acting	Manual starter up to 7½ hp. Generally toggle type, quick acting	No	Drum switch up to 15 hp.	Linestarter	Combination of Linestarter and Circuit Breaker or Safety Switch	Resistance Type or Auto-transformer Starter
High Slip	Manual starter. Generally toggle type, quick acting	No	Drum Switch	No	Linestarter	Combination of Linestarter and Circuit Breaker or Safety Switch
Synchronous	Circuit Breaker with Field Control	Auto-transformer starter with OL Protection and Field Control	Special	No	Linestarter with Field Control	Resistance Type or Auto-transformer Starter
Wound Rotor or Slip Ring	No	Linestarter for Primary Control. Rheostat or Drum Controller for Secondary Control	No	Linestarter for Primary Control. Face-plate Rheostat or Drum Controller for Secondary Control	Combination Line-Resistor in combination with starter in combination with Secondary Controller	Resistance Type No
Single Phase 7½ hp. max.	Manual starter. Generally toggle type, quick acting	Rheostat	No	No	Linestarter	Special No

Note — OL — Overload. LV — Low Voltage.
 * Other remote controls can be used but low voltage release may be obtained instead of low voltage protection.

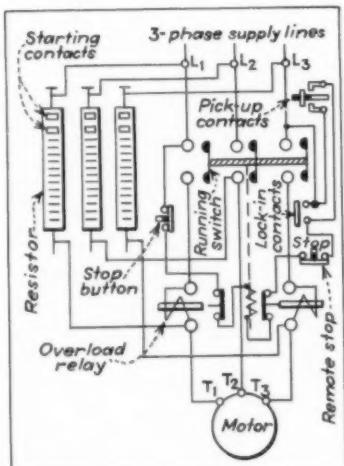
TYPICAL WIRING DIAGRAMS



COMBINATION Safety switch and magnetic full-voltage starter.



CONNECTIONS for manually operated compensator.



SEMI-AUTOMATIC primary resistance starter hook up.

electrically with the secondary controller, so that all the resistance is in the rotor circuit when the motor is started.

Secondary Control

The secondary controller for either manual or magnetic operation may be—

(1) *face-plate type or rheostat*, with the three-phase secondary resistor mounted directly behind the face-plate, forming a unit controller;

(2) *drum controller* for reversing or non-reversing, with secondary resistor mounted separately;

(3) *magnetic controller*, including primary and secondary circuits, and operated by push button or master switch. Special controllers can be furnished for reversing service and speed regulation.

Resistors are designed for either starting duty or speed regulation. Starting duty resistors are for starting purposes only and do not have thermal capacity for continuous reduced-speed operation. For speed regulation or reduced-speed operation, the resistors have different ohmic values and current-carrying capacity. These are divided into two general classes:

(1) *constant torque* or machine duty—for use where the current remains practically constant throughout the entire speed range:

(2) *variable torque* or fan duty—for use where the current is approximately proportional to the speed of the motor.

In general, speed regulating resistors are used for not less than 50 per cent speed reduction, as the speed below this value will be unstable because of the load (torque).

Pilot Control

Pilot devices are frequently called master switches. They carry only the small currents of the control circuits.

Manually operated devices are usually push buttons or small drum switches. Automatically operated master control devices are float switches, pressure switches, vacuum switches and thermostats.

Limit switches are another form of pilot device. Some uses of limit switches with controllers are—automatic reversing, limiting travel in either one or two directions, measuring revolutions of a motor or other rotating equipment and compensating for stretch of cables.

Safety Features

The control should be mounted and enclosed so that it will be protected from mechanical injury as a result of material handling, falling objects, and

the like; also from dripping water, splashing liquids, or processing material which may cause control failure. Enclosures are available in dust-proof, water-tight and explosion-proof construction. Corrosive atmosphere usually requires a starter of the oil-immersed type.

Controllers of every type should be fully enclosed. This is especially necessary when mounted in the vicinity of the operators.

Wherever possible, low-voltage protection should be included to disconnect the motor. This will also prevent the motor and machine restarting automatically after a voltage failure, or excessively low voltage.

Protection against sustained overload should be included in the control. Overload protection is provided generally by thermal relays which have a desirable inverse-time delay feature.

Thermal relays are not designed to protect motors or conductors in case of extremely high currents as occur when short circuit conditions exist. Only fuses or circuit breakers are to be used for such protection.

Selection

Each installation has its own requirements. However, the following general factors need consideration:

(1) Power supply; volts, frequency, phases, two-, three-, or four-wire system;

(2) Special limitation imposed by the power supply;

(3) Frequency of starting;

(4) Accelerating time;

(5) Starting torque;

(6) Variation of load;

(7) Speed requirements;

(8) Conditions of surrounding atmosphere—gas, dust, temperature;

(9) Accessibility for operator, inspection and maintenance;

(10) Location of pilot devices;

(11) Protective and safety features;

(12) Mounting and vibration.

Quite often standard controllers can be selected. But sometimes several motors must be started in sequence, as with a series of conveyors, or again a motor must reverse several times a minute, as on laundry washing machines. For such applications and many others, special control equipment will be required.

This review of a.c. controller types and functions provides, in condensed form, the essential information for choosing correct types of equipment. Beyond this point it becomes a matter of consideration as to the technical features of design that various manufacturers advance for their respective equipment.

DON'T STOP PRODUCTION

TO GET TEST DATA...



Install THIS
**WESTINGHOUSE
INSTRUMENT
SOCKET...**



No longer need you shut down machines in order to make tests on motors or electrical circuits!

Simply by installing Type "S" Sockets in the conduit on your electrical circuits, you can gain *instant* access to vital power and machine performance facts with Westinghouse Socket Instruments. Just remove the socket cover plate, plug in the desired instrument and start taking readings — *in a minute or less*.

Type "S" Sockets, available for as little as \$1.85 each, are quickly installed — no special mounting or expensive accessories required. Start now to benefit from this new, convenient, economical method of using instruments. Send today for complete information. Westinghouse Electric & Mfg. Company, Dept. 7N, E. Pittsburgh, Pa.

Send for Booklet B-2136 — explaining how to get instant access to vital operating facts at lower cost than ever before. Complete line of instruments available.

J-40146


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ELECTRICAL INSTRUMENTS
"The Standard of Accuracy Since 1888"



**NO OTHER RACEWAY
FOR WIRING CAN
GIVE YOU *all*
THESE FEATURES**

- Cold-Rolled Open-Hearth Steel
- 100% Electric Resistance Weld
- Adequate Protection
- Light Weight
- Easy to Cut
- Easy to Bend and Rebend
- No Threads
- 3 Simple Fittings
- Knurled Inside Surface
- Uniform Corrosion-Resistance
- Easy to Install
- Universal Acceptance
- Low Cost
- Widespread Distribution



*Knurled Inside Finish (Patent No. 2,962,874)
available in 3/8", 1/2" and 1" sizes.*

THIS BETTER RACEWAY FOR WIRING

Fully

OK'd

BY Underwriters Laboratories
BY National Electrical Code
BY U.S. Government
BY Specifications WW-T-806a
BY Municipal Ordinances
BY Architects and Engineers
BY Industrial Concerns
BY Everyone who has used it



ELECTRUNITS
REG. U. S. PAT. OFF.
MORE THAN 175,000

Approved

On every length of *genuine* ELECTRUNITE STEELTUBES you will find the red label denoting inspection and approval of the Underwriters' Laboratories—who recommended the wall thickness in which this modern conduit is made. Article 348 of the 1937 edition of the National Electrical Code permits any 600-volt system, using up to No. 0 conductors, to be installed in ELECTRUNITE STEELTUBES for exposed, concealed or concrete work. Federal Specifications approve ELECTRUNITE STEELTUBES for Government work. More than 175,000,000 feet installed in seven years time indicates approval by the electrical industry—by builders and building owners—for almost every type of construction.

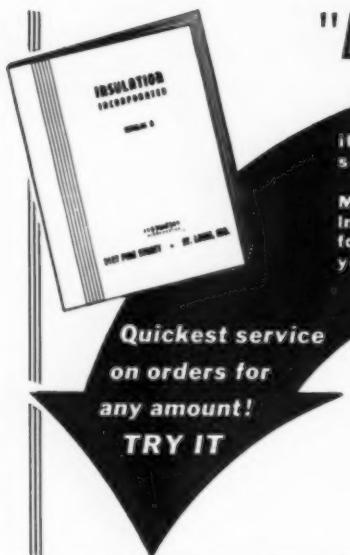
Take advantage of this wide approval. Use *genuine* ELECTRUNITE STEELTUBES. You'll save many backaches. You'll make more money.



Steeltubes

10,000 FEET INSTALLED!

"DO AS I DO



If you want quality and dependable service."

—that's advice from one Repair Shop Man to another—he says, "use the Insulation Incorporated Catalog now, for that Mica Plate and Magnet Wire you need."

Quickest service
on orders for
any amount!

TRY IT

ORDER FROM
Headquarters
One Source of
Supply for Wire
and Insulating
Materials
Quality - Dependability - Service

*Here is a service designed to help you when you need wire and insulating products. Our old customers continue to use this service time and time again—new customers are increasing.

In our Catalog you will find—

MICA PRODUCTS: Made by The Macallen Company of Boston, Mass. Stocked by us and quickly available when you need MICA PLATE, MICA PAPER, MICA CLOTH, MICA and RED ROPE PAPER, MICA and PAPER TAPE, SILK BACKED MICA TAPE, MICA and FISH PAPER and MICA TUBING.

MAGNET WIRE: We handle Essex wire-drawn and rolled from the best grade Electrolytic Copper rod stock. A complete stock of round and square magnet wire kept in stock. Rectangular sizes shipped from our Detroit factory just as promptly. Our catalog features this line completely.

INSULATION INCORPORATED
2127 PINE ST., ST. LOUIS, MO.

**Quicker
Cleaner
Lower Cost
Pipe Cutting**

with this remarkable

RIDGID

Wheel-Blade Cutter

Every **RIDGID** tool is designed to save you bother and expense old fashioned tools cause you. The thin bladed wheel of this cutter, for instance—coined out of tool steel, hammered, heat-treated, assembled in a solid hub—has the extra stamina to keep on rolling cleanly through all kinds of pipe



long after ordinary cutter wheels need replacing. Housing guaranteed warp-proof—always cuts true, twirls easily to pipe size.

Save time and expense with the **RIDGID** Cutter that gives you far more cuts per wheel-blade. Buy from your Jobber—now.

THE RIDGE TOOL CO., Elyria, Ohio

RIDGID PIPE TOOLS

Defrosting Costs Cut

In the fermenting rooms of the Horluck Brewing Co., Seattle, Wash., defrosting was always a costly and tedious job. Ice had to be chipped from cooling pipes by hand, and removed in buckets and wheelbarrows.

This procedure was changed by the installation of nine refrigerating fan cooler units. Each unit is 4x3x2 ft., has two 16-in. 1/2-hp. fans mounted in the rear, and has a capacity of two tons



NO ICE CHIPPING—Refrigerating fan cooler units are defrosted quickly when refrigerant is shut off.

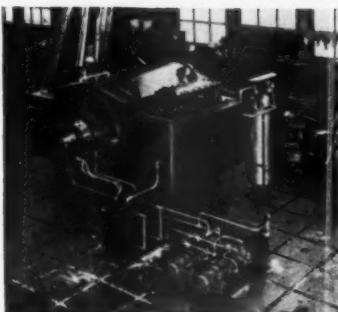
per 24 hours or equal to 600 ft. of 1½-in. old-style pipe installations.

Defrosting is easily accomplished in about two hours by shutting off the refrigerant to the units. When room temperature is lower than 30 deg. F., the units are defrosted by circulating hot compressed ammonia through them directly from the compressor. Not much labor is involved and the units have a simple hook-up to the ammonia line.

Oil Refinery Installs Unusual Motors

Two motors involving an unusual induction design have been constructed by General Electric for oil refinery service. These are two-pole 50-cycle induction motors, rated 1,000 hp. at 3,000 r.p.m., and are being installed by C. F. Braun and Company for Richfield Oil Corporation Refinery at Watson, Calif.

Inasmuch as this size of motor is beyond the range of labelled explosion-proof Class I Group D design, these machines are provided with a closed-circuit system of ventilation incorporating surface air coolers for removing



SURFACE COOLERS and tight enclosures permit use of inert gas in motor for operation in an oil refinery.

heat, as well as a valve arrangement for continuously injecting a small amount of inert gas. These features, together with tight enclosures and special seals, provide the operator with a complete arrangement for maintaining a non-inflammable atmosphere, within the motor, slightly above atmospheric pressure.

The closed-circuit cooling system, unusual for high-speed induction motors, involves directional ventilation. Propeller-type fans force the inert mixture over the motor windings through ducts, and thence through surface coolers, which extract the heat before the mixture is again circulated.

A forced-feed lubricating system furnishes oil to the bearings under pressure by means of two pumps. These pumps operate continuously to maintain a liquid seal at the bearings at all times.

Modernization Reduced Power Losses

Improved operation of equipment and reduced power losses were results obtained when the H. D. Lee Mercantile Co., Kansas City, modernized its substation, switching equipment, and distribution system.

Poor power factor, with resulting energy losses, was caused by operation of small motors and slow-speed motors in the garment factory. By installing a total of 90 kva. in capacitors at various places in the factory, and by replacing



SAME HORSEPOWER—Low speed motor at left, high speed at right. Better efficiency and power factor obtained by replacing former motor with latter.

BULLETIN 102
MILL TYPE CAM
LIMIT SWITCH
COVER REMOVED



COMPACT— BUT NOT CROWDED!

This Bulletin 102 Heavy Duty, Mill Type Cam Limit Switch while compact, provides plenty of Electrical Clearance.

It's a new addition to the "3C" line of dependable controls and its contact wearing parts are completely interchangeable with similar parts on "3C" Bulletin 101 Mill Master Switches.

Needle roller bearings on the $\frac{3}{4}$ " case hardened steel main shaft are mounted in brass blocks. Remove four screws, and the entire shaft and cam assembly lifts out of the housing without disturbing the fingers on the Slate Mounting. That's compact—but not crowded!

Sturdy cast iron, drip-proof housing, double break silver to silver contacts, contact pressure springs retained when movable contact is removed—these—and other features—make this Cam Limit Switch rugged, dependable and full of long time service.



THE CLARK CONTROLLER CO.
1146 EAST 152ND STREET • CLEVELAND, OHIO

AKRON • BALTIMORE • BIRMINGHAM • BOSTON • BUFFALO • CHICAGO
CHATTANOOGA • CINCINNATI • CLEVELAND • DALLAS • DENVER • DETROIT
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FOR PROFITS IN WIRING CONTRACTS



PREST-O-LITE TORCHES and SOLDERING IRONS

These torches and soldering irons supply proper heat for neat, rapid, economical installation of wire and cable. The torches, for open-flame work, produce instantly a concentrated, exactly controlled flame of high temperature. The soldering irons, for enclosed-flame work, can be kept constantly at a desired heat.



These appliances use Prest-O-Lite Gas—which is convenient, economical, and obtainable at thousands of Prest-O-Lite Gas Exchange Service Stations.



Your jobber will demonstrate Prest-O-Lite Torches and Soldering Irons. Call him—or write the Linde office near you.

The word "Prest-O-Lite" used herein is a registered trade-mark.

THE LINDE AIR PRODUCTS COMPANY
Unit of
Union Carbide and Carbon Corporation
New York and Principal Cities
In Canada:
Dominion Oxygen Co., Limited, Toronto



DEAD-FRONT circuit breaker switchboard eliminated loss in operating time from blown fuses.

a number of slow-speed motors with high-speed motors, the power factor was raised from 46 to 98 per cent. Interlocking and time-switches were installed to cut out capacitors when not needed, thus averting excess correction losses.

Increased transformer capacity in the company's substation was obtained with the improvement in power factor, by reducing the load from 250 to 130 kva. And still another result—reserve capacity for expansion and increased load, without further service equipment investment.

No More Warping

Among the most important products fabricated by the Frauneder Ornamental Iron Works, Oakland, Calif., are decorative panels for doors and store fronts. For some time, the company has employed welding as an economic and efficient means of producing this work. But it found that, while a large welder would do the job, the resultant heating warped the panels. It cost \$1.50 to straighten each panel after welding was finished.

The answer to the problem was to suit the welder to the job. The company now does the work with a General Electric "Mutator" welder. Since installing this equipment, it has produced 350 panels, each one requiring 65 welds. Out of the total of more than 22,500 welds thus made, only two failures have been encountered and both of these were avoidable. More significant, however, is the fact that warping has been eliminated entirely. This means that the welding equipment has saved Frauneder \$525 to date—more than three times the original cost of the welding equipment.



CONNECTORS and COUPLINGS

White Zinc Finish
for Electrical Metallic Tubing

Their Simplicity makes them preferred

So simple, in fact, that two squeezes on the handles of the B-M Indenter and the B-M Connector or Coupling is securely fastened to the Electrical Metallic Tubing. No lost time—no complicated installation troubles.

Our tools and method of fastening the fittings to the tubing are patented and we limit the license of our tools under these patents to the installation of our fittings only.

Listed by Underwriters.



No. 605 B-M Indenter

Distributed by:
THE AUSTIN CO.
Chicago, Illinois
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GENERAL ELECTRIC CO.
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Elmhurst, New York City
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Pittsburgh, Pa.

**BRIEGEL METHOD TOOL CO.
GALVA, ILLINOIS**



* Sell Mercury Vapor lighting for industrial plants—and you talk, not only of better lighting but greater economy. Every man responsible for a factory's production and operating costs wants to know how to cut his lighting bill. And you can show him—with a Mercury Vapor lighting system powered by Acme High Intensity Mercury Vapor transformers. None Better. Write for details.

**THE ACME ELECTRIC & MFG. CO.
36 Water St. Cuba, N. Y.**

Acme **Electric**
TRANSFORMERS

Perfect welds are obtained with low current input and small electrodes. In addition, the job can be done 20 per cent faster.

The low-current welder has also been used on ornamental grill work and in the fabrication of approximately 168 wire panels. In the former case,



LOW CURRENT welding of metal panels increased welding speed 20%.

it has eliminated about 25 per cent of the previously necessary grinding and smoothing. The frames for the wire panels are fabricated from one-half inch round stock. No grinding at all is required on this job, and no warping has been experienced.

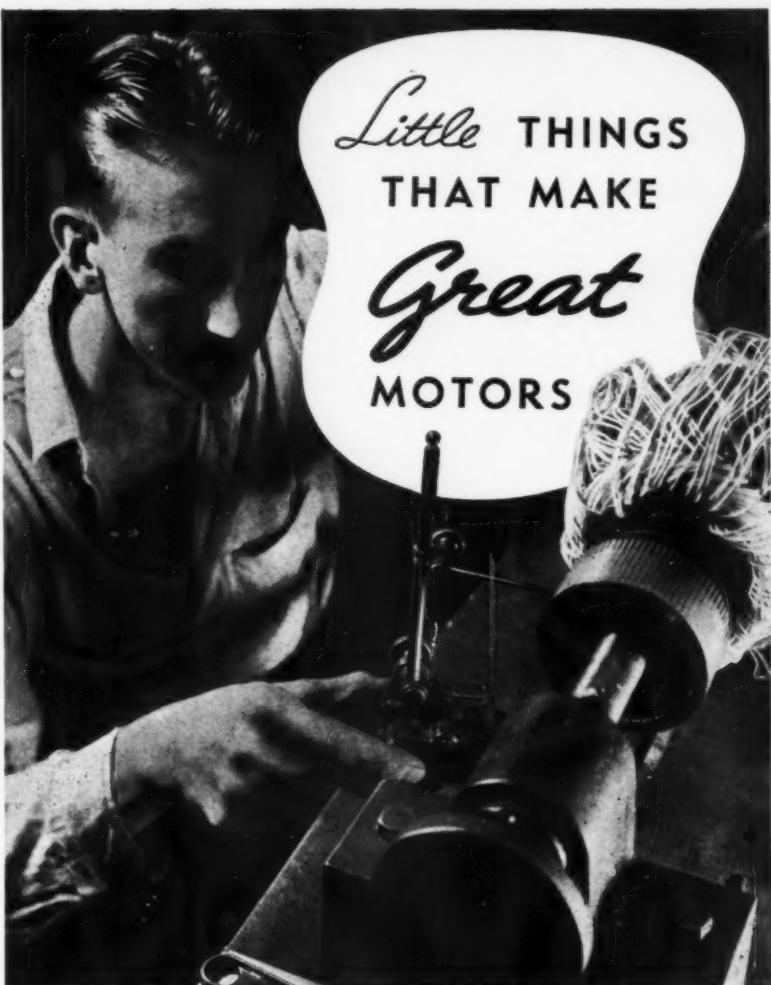
"Electric Eye" Watches Oil Burner Flame

A specially designed furnace is used for melting metals in a chemical manufacturing process. An automatic pilot was not required because the furnace operated continuously. Also, because of the high operating temperature, a thermostatically controlled valve for instantaneous shut-off was impractical except at excessive cost.

An "electric eye" was installed to maintain a continuous "watch" on the flame of the oil furnace and provide immediate protection in case the flame is extinguished. If light from the flame fails to reach the photocell, a relay controlled by the cell actuates a solenoid-operated valve, and instantly shuts off the oil supply.

The light sensitive cell is mounted about a foot back from an opening in the furnace wall and in view of the oil flame. To prevent an accidental external interruption of the action of the light of the flame on the unit, a perforated metal guard has been placed around the unit and extends to the wall of the furnace. The relay panel and solenoid valve are located on an adjacent wall.

Under normal operating conditions, the current generated by the photocell holds a sensitive relay in an open position. However, on failure of the oil flame, the sensitive relay closes and a power relay which it controls actuates the solenoid and immediately shuts the oil valve.



SOME might consider a motor "good enough" even though the commutator bars and rotor segments were a trifle out of alignment. But not Fairbanks-Morse. F-M inspectors make certain that *all* alignments are exact . . . not on each tenth or twentieth motor, but *on every F-M motor built*.

This is a typical example of the little things that make F-M motors great . . . assure you many years of efficient, trouble-free service. Write Dept 24, Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill. 35 branches at your service throughout the United States.

7390-EA97.32

FAIRBANKS-MORSE

DIESEL ENGINES REFRIGERATORS
PUMPS RADIOS
ELECTRICAL MACHINERY WASHERS
FAIRBANKS SCALES FARM EQUIPMENT
RAILROAD EQUIPMENT STOKERS
WATER SYSTEMS AIR CONDITIONERS

 Motors

I'LL BET
BUNTING
LISTS IT AS A
STOCK ITEM

BUNTING stock bearings service all makes of motors from 1/40 hp to 60 hp. Available instantly. Completely finished—ready for assembly . . . Write for catalog today.

THE BUNTING BRASS & BRONZE COMPANY . . .

BRANCHES AND WAREHOUSES IN ALL PRINCIPAL CITIES

TOLEDO, OHIO

BUNTING Quality
BRONZE BUSHINGS • BEARINGS
MACHINED AND CENTERED BRONZE BARS
BABBITT METALS

A. C. Automatic Motor Starter

non-reversing
across the line type
with three-position
selector switch in cover

"AUTOMATIC" position permits operation from remote station or pilot device.

"OFF" position starter is inoperative.

"HAND" position starter is in "On" position and is operative only from local position.

You will have call for this Motor Starter. Send for bulletin number 4002 so you can answer questions and make quotations.



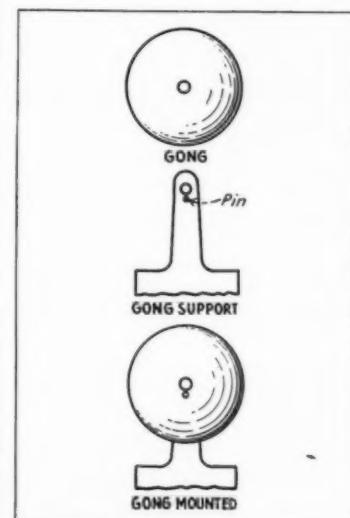
WARD LEONARD
ELECTRIC COMPANY
28 SOUTH STREET, MOUNT VERNON, N. Y.
Electric Control Devices Since 1892

Holding Gongs in Place

While most modern bells include features for adjusting and fastening the gongs, some of the older bells often require adjusting, especially in locations where considerable vibration is prevalent. One method is to use a lock washer between the head of the gong fastening screw and the gong itself. However, this method has not always proven to be the best remedy.

Another method is to drill a small hole through the gong close to the center hole. Drilling is continued into the neck or support for the gong. Another drill slightly larger than the first is used to enlarge the original hole made in the gong.

Finally a steel pin is driven into the smaller hole in the neck or support, which must be sufficiently long for it to extend upward and pass through the gong. Details showing the locations of the pin and the drillings are shown in the sketch.



GONG LOCK—Simple method of securing a gong that habitually works loose.

Grounding Pointers

One way to prevent accidents and not have them chalked-up against the electrical maintenance division is to have good ground connections. The N.E.C. code specifies how grounds are to be made. Ground connections should be made with conductors of ample capacity and connected permanently to equipment such as (1) conduit pipes, (2) electric switches and starters, (3) motor frames, (4) electric heaters, (5) portable tools and equipment, (6) transformer cases.

Electrical Contracting, June 1938

INSPECTION SERVICE

[FROM PAGE 16]

and a well designed cleaning tank. All operations must be arranged in sequence and at the various stations have all necessary small tools. A good way to keep tools in their proper place is to color them. Use baking enamel in the grooves of screw driver handles, hammer handles, knurled parts of socket wrenches, etc. Paint the same colors on the bench at the stations along the line. Keep the work always at bench level. Don't carry motors or parts any distance. Make a toter and move them on wheels.

A Separate Department

These operations must be kept separate from other activities in the shop except perhaps the winding and dipping and baking. However, stators and rotors must be cleaned, stripped, new commutators attached when necessary, core insulated and otherwise prepared in the small motor section, ready to receive wire before going to the winding department. Commutators and insulating materials such as slot cells, wedges, fibre core punchings, will usually be supplied by the motor manufacturer, if service arrangements have been made, at a small percentage over the cost of the material.

Compartment trays with all small parts should be available at your finger tips. Do not keep a record and charge these items to each job. Your system will cost more than its value. And last, but not least, make a show place of this department by having clean and neat looking tools and benches, and invite your customers to look you over.



ROME-CABLE

BUILDING WIRE

FROM START TO FINISH

Wire and cable by "Rome Cable" is rigidly inspected throughout its entire period of manufacture, from copper wire bar till its final form. This means that you can assure your customers of extra long life and service which in turn, means increased sales and bigger profits for yourself.

ROME CABLE QUALITY

Code, Intermediate 30% and Superstranding
Approved by the Underwriters' Laboratories, Inc.
N.E.C.S.
Flame & Moisture Resistant

Slick finish for Quick and Easy Pulling
Long Aging Rubber Uniformly Small Diameters
Clean—Easy Stripping
Eight Clear Distinct Colors

PRODUCTS

Hot rolled rods, bare and tinned copper wire, bare and tinned strand, U.R.C. weatherproof wire, cotton, paper and asbestos magnet wire, rubber insulated wires and cords, lead covered cables.

SALES OFFICES

New York, Chicago, Philadelphia, Pittsburgh, Richmond, Cleveland, Boston, Dallas, Los Angeles.

PAINÉ SECTIONAL SWITCH BOXES

PATENTED

INSIST UPON THESE ADVANTAGES

APPROVED by Underwriters Laboratory . . . GANGABLE . . . any size or style to fit your needs . . . NAIL HOLES in the sides a PAINÉ feature . . . CLAMPS OUT OF WAY for easy insertion of cable . . . VISIBLE OPENINGS for Anti-Short bushings . . . MOST CONVENIENT quickly snapped together or pried apart . . . STRONG and RIGID in design . . . ATTRACTIVELY PRICED and QUICK DELIVERY . . . PATENTED.

NEW WORK BRACKET SUPPORT INDICATED BY LETTER (K)

Heavy stamped steel. Riveted securely to the side of the switch box. Holds box flush with plaster line. Use this bracket support for a firm, rigid installation with lath support full length of the switch box.

VALUABLE CATALOG

The new PAINÉ book, METAL SPECIALTIES FOR INDUSTRY, illustrates and describes Rigid Conduit, Loom Switch and Armored Cable and Sheathed Cable PAINÉ Sectional Switch Boxes. Send for a free copy today.



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SEND FOR THE
COMPLETE NEW
PAINÉ CATALOG
TODAY

9 The News

MOTOR SHOP POW-WOW

Shop Men Consider Better Selling, Certification And New Techniques—Lauder Now President

Better methods of selling, management and shop practice were outlined before the annual meeting of the National Industrial Service Association at the Palmer House, Chicago, April 25, 26 and 27, attracting over 200 delegates from motor shops all over the United States and Canada.

Addresses presented valuable material on labor relations, sales methods, cost data, new products and new shop techniques, association benefits and legal problems.

A National Certification Plan for motor shops, worked up by a committee during the past year, was submitted by F. W. Willey of Cincinnati. The plan is to be ready for operation in three months' time, if members act on it promptly. Under the proposed plan, shops able to qualify by experience, ability and equipment will join a national certification program in a combined effort to improve shop practices and promote customer confidence.

Laurence W. Davis, General Manager of the National Electrical Contractors' Association, advocated manufacturers' price schedules with adequate differentials to wholesaler, contractor and retailer. Machinery is now set up in 42 states, he said, to permit such schedules, but manufacturers will not act unless they have substantial backing by the rest of the industry.

From national trade publications, H. L. Horton, Associate Editor of *Electrical Manufacturing*, discussed new sales approaches and shop routines. Earl Whitehorn, Editor of *Electrical Contracting*, urged the motor shop industry to abandon the "fix-it" attitude and become electrification specialists to local industries, to apply its knowledge in terms of application engineering to solve the pressing need of industrial management for sound advice and aid in their complex electrification problems.

Glass for insulation was the subject of papers presented by J. P. Davis of Anaconda Wire and Cable Company and Randall Hagner of Owens-Illinois Glass Corporation. E. R. Perry of Westinghouse discussed the application of insulating materials. E. J. Robinson, of the J. W.

Murphy Co. outlined the use of electrical instruments in the shop and in the customer's plant.

Winding costs based upon physical dimensions, a subject which aroused much interest in last year's meeting, was explained in further detail by Geo. P. Svendsen. Costs and prices were also the subject of papers by Paul G. Winter, American Electric Co., Indianapolis, who presented an annual summary of rewinding prices and Gardner Hoffman, Tennessee Armature and Motor Works, Knoxville, Tenn., who presented an accurate system of costing individual repair jobs.

In a closed session for members on Tuesday morning, John E. Launder and J. M. Pilmer outlined the "National Rebuilt Motor Exchange Plan." Stewart N. Clarkson, Stewart N. Clarkson Associates, Inc., New York, discussed methods of keeping up active interest in association work. E. C. W. Johnson, Scherer Electric Company, Indianapolis, presented methods of compensating service salesmen and their rela-

tive effectiveness in getting sales. Frank Willey of Cincinnati outlined a profit sharing plan for employees in use by his company since 1920.

Frank M. Mielke of Duluth gave valuable data on the profitable handling of fractional horsepower motor repairs, and John E. Launder of Kansas City on motor inspection service. The convention sessions were closed by an open forum on practical shop methods by Frank Willey, Cincinnati, J. E. Launder, Kansas City, S. H. Martin, Chicago, R. A. Scherer, Indianapolis, H. H. Roessle, Pittsburgh, and M. M. Argo, of Birmingham, Ala.

New officers elected for 1938 were, John E. Launder, Kansas City, President; Carl A. Sievert, Chicago, Vice President; Paul G. Winter, Indianapolis, Secretary, and Alfred L. Brown, Worcester, Treasurer.

The Chicago convention committee, led by Carl A. Sievert, organized an entertainment program which included an evening in "Little Bavaria" and a trip to the famous Brookfield Zoo to see the Giant Panda. Many outstanding Chicago shops held open house for the convention visitors. At the annual banquet, F. T. Whiting, President of the Chicago Electric Association, was toastmaster, and E. W. Lloyd, Vice President of the Commonwealth Edison Co. of Chicago made the principal address.

A-W MESSAGE TOLD IN 218 CITIES

In three months the National Adequate Wiring Program has been presented in 218 cities in 43 states. Of these cities, 101 have ordered promotional materials and approximately 90 have already held or scheduled local industry meetings. New York, Washington, Los Angeles and Birmingham have been licensed to operate the certification plan. Philadelphia, Charlotte (N. C.), Memphis and the Tri-Cities (with league headquarters at Rock Island, Ill.) have submitted wiring standards for approval.

Here are some recent sectional activities:

"It's lucky for them they had the place wired for electricity—it's the only thing that's holding the house together."



Electrical Contracting, June 1938

In Philadelphia, 217 contractors attended A-W meeting during the recent Philadelphia Electric Exposition.

In Florida, a meeting of 150 electrical men, architects and builders was held in Miami on May 26 by the Illuminating Engineering Society. This was the sixth of eight weekly meetings scheduled during an Adequate Wiring and Lighting Course.

In New Orleans, more than 100 attended meeting sponsored by the Electrical Association to announce plan for tying in with the National Adequate Wiring Program.

In Spokane, electrical contractors, wholesalers, contractor-dealers and utility executives organized a local bureau.

In Minnesota, ten meetings recently held under the sponsorship of the North Central Associated Electrical Industries.

WARREN QUILTS ELECTRICAL COMMITTEE

Howard S. Warren, for many years a member of the Electrical Committee, N.F.P.A., recently announced his retirement from the chairmanship of the article committee on grounding. Mr. Warren is

opening an engineering office at 420 Lexington Ave., New York City, as a consultant in electrical protection, after completing 38 years' service with the Bell system, where he was director of protective development of the Bell Telephone Laboratories. He has contributed much to the cause of safe electrical installations, particularly as chairman of the American Research Committee on Grounding, a position which he still retains.

MINNESOTA ADOPTS FARM STANDARDS

Rural wiring standards adopted in Minnesota are now available to contractors in that state. These standards were prepared at the request of the State Fire Marshall's Office by representatives from all interested groups. Based upon N.E.C. requirements the new rulings bring together and simplify the code rules for farmsteads with particular emphasis on grounding.

Revising wiring systems previously energized by 32 volt plants or other local supply, is also ruled upon in concise form, requiring these systems to be brought up to

minimum standards before connecting to a new source of electrical supply.

1. Approved service and distribution equipment shall be provided for.

2. Branch circuit protection shall conform to standards for new installations except as provided in item 9.

3. Wire sizes shall conform to code requirements.

4. All conductors or cables must be properly insulated and fastened in place.

5. Unsoldered joints shall be properly joined, soldered and taped.

6. Outlet boxes should be installed wherever required as in new work. Ceiling plates may be used where fixture canopy provides adequate space for connections.

7. The entire system shall test free from grounds.

8. All connections in fixtures and devices shall be checked and put in safe condition.

9. Wiring systems shall be polarized wherever same can be reasonably accomplished, otherwise the overcurrent protection shall consist of a circuit breaker which will open all conductors simultaneously. In no case shall fuses or single pole circuit breakers be depended upon to open the circuit, if it is impossible to completely polarize the wiring system.



THE CAMERA PROWLS AT THE NISA CONVENTION—(1) Wm. J. Wheeler of New York who piloted NISA through a progressive year. (2) New Officers—Alfred L. (Andy) Brown, Treasurer; John E. Launder, President; Paul G. Winter, Secretary and Carl A. Sievert, Vice President. (3) E. C. W. Johnson and Geo. P. Svendsen in a bundle on resolutions. (4) Ed Herzberg of Milwaukee enjoys the party at "Little Bavaria". (5) With Flash Gun and minicam, past president E. C. W. Johnson of Indianapolis mercilessly stalks his prey. (6) Chicago Greeter Roy Hyre steers members to register. (7) Propped against a fence at Brookfield Zoo. (8) Shop talk while waiting for sauerbraten and noodles.

QUALITY means ECONOMY

- EASIER BENDING
- EASIER CUTTING
- EASIER THREADING
- EASIER WIRE PULLING

"ELECTRICTUBE"

Electrical Metallic Tubing is coated on the exterior with a substantial amount of zinc evenly deposited by electro-plating process to stand severe corrosive conditions. Interior surface is coated with a enamel especially developed by us which is impervious to acid and insures a perfect raceway for pulling wires. Can be used with any standard light wall fittings.



"GALVAKOTE"

Exterior surface and threads coated with zinc evenly deposited by electro-plating process in quantity to withstand more than four dips of Preese test in regulation copper sulphate solution. Interior furnished coated with the best quality black enamel.



"ENAMELKOTE"

Coated inside and outside with high grade black enamel, properly baked in modern ovens to insure adhesion to pipe wall, and sufficient flexibility to prevent flaking in bending.



"HOTKOTE"

Exterior and interior surfaces evenly coated by the hot galvanize process and then covered inside and outside with a coat of transparent enamel.



"HOTKOTE" NIPPLES

These rigid conduit nipples are also approved by the Underwriters' Laboratories and so labeled. All threads are protected by a special coating that is rust resisting.

Underwriters' Laboratories tested and approved.

Distributed everywhere by leading wholesalers.

CLAYTON MARK & COMPANY
20 N. Wacker Drive, Chicago
U. S. A.

MANUFACTURERS FOR MORE THAN A THIRD OF A CENTURY.

In the News

[FROM PAGE 47]

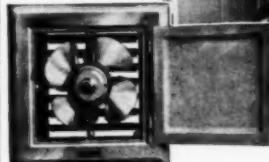
NEW LOS ANGELES SET-UP

Electrical Contractors' Council, Inc., of Los Angeles, a code group of larger local operators has been dissolved. The Los Angeles branch, Southern California Chapter of NECA has set about to provide the organization which had been attempted through the dissolved Council. A. L. Stone, Stone Electric Supply Co., Los Angeles, NECA executive committeeman for District 9, was reelected president of the branch, with H. L. Evans of Nicholas Electric Co., vice-president. The new executive committee includes George DeAth, Peerless Electric Co.; Al Wotkins, Quality Electric Co., Ltd.; R. R. Jones of South Pasadena; George L. Patterson, Los Angeles; and L. L. Goddard, Pacific Electric and Mechanical Co.

In accepting reelection Mr. Stone declared a policy of closer affiliation with all branches of the industry including labor. He appointed a labor committee consisting of V. B. Sayre, chairman, H. L. Evans, J. O. Case, R. R. Jones, George DeAth, C. T. Smallcomb and C. J. Bennett.

A KITCHEN Necessity

in
EVERY
HOME



List price is \$32.00

Fan is easy to install, and adjustable to Signal Automatic Wall Box Kitchen Vent wall thickness . . . removes cooking odors, steam, smoke, and excess heat . . . operates quickly and quietly . . . available for A. C. or D. C. current; A. C. type is non-radio interfering . . . 10" quiet-type fan, cast aluminum frame. We will gladly send you complete information upon request.

SIGNAL ELECTRIC MFG. CO.

Menominee, Michigan

Offices in all principal cities

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HERWIG

OUT-DOOR LIGHTING FIXTURES



Apartment Buildings
Public Buildings
Bungalows
Churches
Schools
Garages
Country Clubs
Warehouses
Residences

A FIXTURE FOR EVERY OUTDOOR PURPOSE

Cast Iron or Bronze

Send for our

Catalogue No. 40

200 Illustrations

The

Herwig Company

MANUFACTURERS

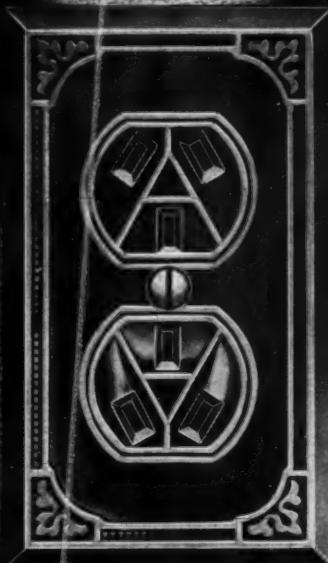
Established 1908

1753-59 Sedgwick Street

Chicago, Illinois, U.S.A.

Modern Numbers Shown on P. 4 & 5
—Also Furnished in Cast Aluminum
—Polished or Satin Finish

ARROW



DUPLEX RECEPTACLES

The new standard and polarized Duplex Receptacles show customers an *extra value* in SOLID CONSTRUCTION. Heavy Bakelite back-plate gives basic strength and rigidity to the whole device. Binding screws specially designed have extra-large heads to take wire up to No. 10 inclusive. All functioning parts, as well as frame, have the added structural

strength of heavier-gauge metal... No. 1913 is standard T-slot. No. 1918 Polarized Receptacle takes special polarized plugs only. No. 7051 3-wire Receptacle is of regular ARROW construction with large binding-screws.

Write these *three new numbers* into your orders — to specify more-Receptacle-for-your-money!

SOLD THROUGH YOUR

ARROW ELECTRIC DIVISION
THE ARROW-HART & HEGEMAN ELECTRIC CO., HARTFORD, CONN.

ELECTRICAL WHOLESALER

Line up with QUAD



LONG BEAM
FLOODLIGHT



POST TOP
REFLECTOR



DOME REFLECTOR
FOR MERCURY
VAPOR



VAPOR PROOF
FIXTURES AND
REFLECTORS



DUPLEX DOME

AND
HIT THAT
SALES'
BULLS-EYE

★ Shoot straight and true when you go after lighting installations—get those sales—satisfy those customers—make money—get that repeat business—build good will. Summer, Fall, Winter, Spring—for all lighting requirements depend on Quad and be sure.

If you sell floodlighting you should have QUAD'S Wall Chart Selector showing complete floodlighting line. Send for it NOW!

QUADRANGLE
MFG. CO.

32 S. PEORIA ST., CHICAGO, ILL.

In the News

[FROM PAGE 48]

PLAN NEW HIGH FOR ELECTRIC WATER SYSTEMS

An objective of 1,500,000 electric water systems in rural and suburban homes in the next five years has been set under the 1938 plans of the Electric Water Systems Council. The past sales record has been: 108,000 units sold in 1935; 150,000 in 1936, and 190,000 units in 1937.

A plan book for 1938 was distributed about February 1st to dealers, utilities and other local distributors, who aim to tie in on 1938 selling plans. Rapid expansion of rural electrification is expected to provide unparalleled opportunities for increased sales in bringing about the betterment of rural living conditions. Council headquarters are at 420 Lexington Avenue, New York, N. Y.



FACT SALESMAN—Among the first purchases made by J. J. Donohue when starting the J. J. Donohue Electric Co. at Worcester, Mass., last fall was an industrial analyzer instrument outfit. He considered this one of the important tools required to sell industrial installation and modernization work. Other small instruments owned by Mr. Donohue include a phase rotation indicator used for changeover jobs. The new electrical calculator at left takes care of hurry-up pricing and extension jobs on estimates.

AIR CONDITIONING TREND SURVEY

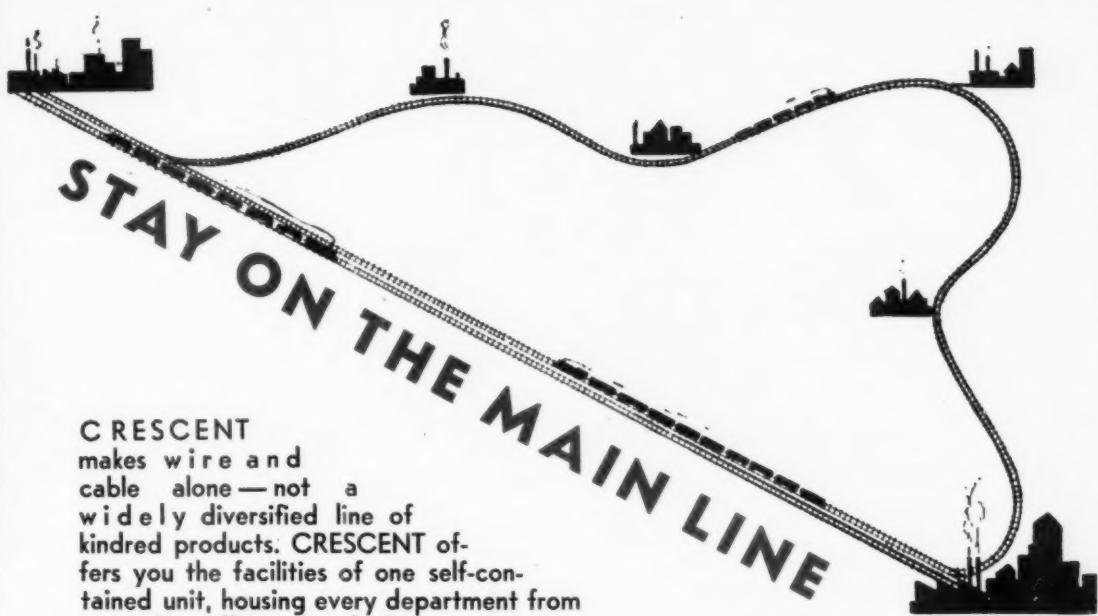
A nation-wide, personal-interview study of the air conditioning industry was recently completed by the research department of the McGraw-Hill Publishing Company. It covers an analysis of the market, also distribution, installation and promotional phases of this business. Field studies include 1084 companies in the industrial and commercial market, distributors, dealers, contractors, engineers, architects and public utilities. Mail questionnaires were also sent to over 1200 distributors, dealers and contractors. Here are highlights of this survey:

1. Almost half of these establishments studied are prospects for original or additional installation.

Electrical Contracting, June 1938

VARNISHED CAMBRIC • RUBBER POWER CABLES • BUILDING WIRE • RADIO WIRES • SIGNAL CABLE • FLEXIBLE CORDS • LEAD-ENCASED AND PARKWAY CABLES • ARMORED CABLE

ORDERS PLACED WITH CRESCENT



CRESCENT

makes wire and cable alone—not a widely diversified line of kindred products. CRESCENT offers you the facilities of one self-contained unit, housing every department from executive offices to shipping room; performing every manufacturing operation in one plant.

At CRESCENT your orders stay on the main line of production—not side-tracked from one plant to another. Your orders are under the watchful eyes of men who are vitally interested in seeing that your specifications are faithfully carried out and the orders delivered as you want them. The result—SUPERIOR CRESCENT SERVICE!

CRESCENT
INSULATED WIRE & CABLE CO. INC.
TRENTON, NEW JERSEY.

SALES REPRESENTATIVES AND WAREHOUSE STOCKS

ATLANTA, GA.....	Edgar E. Dawes A-4 Rhodes Bldg. Annex
BALTIMORE, MD.....	111 Chesapeake G. C. Pierce Co.
BOSTON, MASS.....	241 Franklin St. Crescent Sales Co.
*BUFFALO, N. Y.....	294 Elm Street Crescent Elec. Sales Co.
CHICAGO, ILL.....	624 W. Adams Street The Hengen-Fairfield Co.
*CINCINNATI, O.....	712 Sycamore Street The Hengen-Fairfield Co.
CLEVELAND, O.....	1800 Columbus Road The Hengen-Fairfield Co.
*DALLAS, TEX.....	Royal Smith 912 Commerce St.
DETROIT, MICH.....	Hempill & Co. 517 E. Woodward Street
*HARRISBURG, PA.....	Clement Sales Co. 367 Kline Bldg.
INDIANAPOLIS, IND.....	A. Lee Clifford 330 W. New York St.
*KANSAS CITY, MO.....	W. F. Howe & Co. 526 Law Building
LOS ANGELES, CAL.....	Hempill-Hall Co. 100 S. Hillott St.
MINNEAPOLIS, MINN.....	R. H. Cassels Co. 324 First St., No.
*NEW ORLEANS, LA.....	Paul Hogan, Jr. 366 Lower Bldg.
NEW YORK, N. Y.....	Kearon & Nagle 100 W. 42nd St.
*PHILADELPHIA, PA.....	E. R. Byler The Bourse Bldg.
PITTSBURGH, PA.....	Crescent Sales Co. 298 Duquesne Way
ST. LOUIS, MO.....	Leigh A. Dexner Co. 115 S. 11th Street
SAN FRANCISCO, CAL.....	Hodges & Gleomb 1204 Folsom St.

* Do not carry stock

CRESCENT ENDURITE SUPER-AGING INSULATION • WEATHER PROOF WIRE

THE MAN★ OF THE HOUR!

His is the experience, the judgment, the skill and the practical knowledge upon which ADEQUATE WIRING depends.

And the WIREMOLD COMPANY, Hartford, Conn., "WBB Headquarters," is ready as usual to help him make the most of it.



★ "WBB" is the trade name of an electrical contractor who knows how to "build his business" with Wiremold. He is the "Wiremold Business Builder."

If your name is not on the "WBB" mailing list, send it in now!

2. Among present users, 37.5 per cent of the commercials and 39.3 per cent of industrials need additional equipment.

3. Of non-air conditioned establishments, 71.8 per cent in commercial fields and 49.8 per cent among industrials recognize the need for air conditioning.

4. Among present industrial installations studied 48.6 per cent are more than 5 years old, while commercial installations reveal 26.5 per cent made in 1937, 28.3 per cent in 1936 and 15.1 per cent in 1935.

5. Industries show 77.9 per cent using air conditioning the year round, averaging 18.4 hours of use per day, while only 27.4 per cent of the commercial systems are operated all year at an average use of 12.6 hours per day.

6. Franchises are held by 76.7 per cent of the electrical contractors engaged in air conditioning, with manufacturers of such equipment.

7. Exclusive air conditioning salesmen are employed by 83.3 per cent of these electrical contractors.

8. During last year electrical contractor sales of air conditioning increased 66.7 per cent, as compared with an increase of 70 per cent in sales during 1937 for the entire air conditioning industry.

BOOK REVIEWS

Controlling Grain Dust

A Research Bulletin, "Control of Floating Dust in Terminal Grain Elevators," has recently been published by Underwriters' Laboratories, Inc., available upon request. Since 1930 there have been more than forty grain elevator explosions resulting in loss of lives, many injuries, and a property loss of some \$3,500,000 according to N.E.P.A. reports.

This research bulletin covers suction methods of controlling grain dust. The application of dust removal equipment to terminal grain elevator machinery is discussed. The report covers air velocity at suction hoods and in pipe lines, and other details of design for dust removal systems.

New Book on Graphic Instruments

"Graphic Routes to Greater Profits," a book on the use of graphic instruments in industry, by John W. Esterline, is announced by the Esterline-Angus Company of Indianapolis, Ind. Following a short introduction on the general scope of instrument analysis in industry, there are more than 250 practical case studies, each covering a distinct problem, giving the procedure followed, the graphic charts obtained and the solution reached.

As a practical contribution to the art of applying the scientific method to the conduct of industry, this volume will be of particular interest to plant executives, electrical maintenance engineers, and electrical contractors or motor dealers interested in plant analysis technique. This book is available from the Esterline-Angus Company at \$3.00 post paid.

School Lighting Standards Released

A revised "American Recommended Practice of School Lighting" is now available after two years of complete rewriting under the rules and procedure of the American Standards Association. This new publication is available as an American standard. The revision was made under the sponsorship of Illuminating Engineering Society and the American Institute of Architects, with the collaboration of a Sectional Committee on School Lighting. This committee in-



You may have been accustomed to buy motor starter and a circuit protective device in two separate units. Today it's thrifty to buy both in one—the Westinghouse Combination Linestarter. This unit offers you all the advantages of both the "De-ion" Linestarter and the Nofuze "De-ion" Circuit Breaker. It's a combination that will save money for you, because:

- IT SAVES IN INSTALLATION COST
- IT REDUCES OPERATING COST
- IT'S COMPACT
- AND IT'S SUPER-SAFE

Send for the new booklet "4 Points to Check" describing the Combination Linestarter in full. Simply write or phone your electrical wholesaler.

Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa.

J 20522-A



Westinghouse

"DE-ION" COMBINATION LINESTARTERS

WHAT "DE-ION" MEANS



THE OLD WAY



THE "DE-ION" WAY

In the past, arcs have been broken by "stretching". The "De-ion" quencher confines, divides and extinguishes the arc almost instantly—obviously preventing burning heat on contacts or arc barriers.

CHECK THESE 9 FEATURES

- FULL SAFETY
- COMPLETE MOTOR AND CIRCUIT PROTECTION
- BI-METALLIC OVERLOAD PROTECTION
- FRONT OPERATING HANDLE
- AMPLE WIRING SPACE
- UNUSUAL ACCESSIBILITY
- COMPACT SIZE
- ATTRACTIVE APPEARANCE
- LOWER INSTALLED COST

MOTORS • LINESTARTERS • CIRCUIT BREAKERS • SAFETY SWITCHES • PUSH BUTTONS

MODERN

Built to meet to-day's
requirements . . .



Type CFT, three-phase, outdoor type,
air-cooled transformer.

equipped with either conduit fittings or a built-in junction box to facilitate installation, and both single-phase and polyphase types are furnished as a single unit. These features mean low first cost and minimum installation and maintenance expense. May we send data on equipment to meet your needs?

* Units 15 Kva. and larger for indoor service only.

Type "CF" Applications

1. Stepping down power circuit voltage to 115/230 volts for lights, small motors or heating elements. In this way advantage may be taken of lower power rates for low-voltage loads.
2. Obtaining a 3-wire circuit from a 2-wire system.
3. Changing from 3 phase to 2 phase, or vice versa, on a power system.
4. Obtaining low voltage for heating, welding, 32-volt tools, special lighting, testing, etc.
5. Balancing load on 3-phase systems.
6. Insulating one circuit from another.
7. Distributing power at 600 volts or less.
8. Reducing light flicker.
9. Obtaining special voltages to permit efficient operation of equipment.

AMERICAN TRANSFORMER COMPANY

178 Emmet St., Newark, N. J.

AMERITRAN
TRANSFORMERS

Manufactured
Since 1901
at Newark, N. J.



Type CF, single-phase,
indoor type, air-cooled
transformer.

In the News

[FROM PAGE 52]

cluded eyesight specialists, physicians and others.

The complete text and illustrations comprise 56 pages of the April Transactions of I.E.S. There are five parts to these standards—I, Lighting and Education; II, Factors which affect Lighting and Seeing; III, Natural Lighting; IV, Artificial Lighting, and V, Wiring.

Revised tables give new minimum foot candles of general illumination for various locations in the school, average intensities provided in rooms of various dimensions by several fixture sizes and types, and a minimum watts-per-square foot table for determining adequate school room wiring. The application of photoelectric control devices is also discussed. For determining the lighting requirements for athletics there are recommendations covering layouts for archery, badminton, football, hockey, softball and tennis.

Reprints of the new school lighting recommendations are available at 25c. each through the Illuminating Engineering Society, 51 Madison Avenue, New York City.

MANUFACTURERS NEWS

Knox Porcelain Corporation, Knoxville, Tenn., makes its fourth major expansion in 12 years. Following the recent erection of a continuous circular kiln that doubled the capacity of the plant, 2500 sq. ft. of floor space has been added and new assembly equipment installed.

General Cable Corporation has moved its Chicago office from 20 N. Wacker Drive to 111 N. Canal Street.

E. L. Burland has been appointed district sales representative for General Electric wiring materials in Alabama, Tennessee, Mississippi and Louisiana with headquarters at Birmingham, Ala.

Independent Pneumatic Tool Company of Chicago, announces the opening of a new sales-service branch at 6200 E. Slauson Ave., Los Angeles, California. The new office will be in charge of B. J. Herron.

Westinghouse Electric & Manufacturing Co. announces the appointment of R. F. Frenger as sales manager of the switchgear division.

The Herwig Company, Chicago, announces appointment of representatives: Andrew D. Legg, 94 Florence Ave., Arlington, Mass., will cover the New England States; R. H. Witherspoon, 36 Alabama St., S. W., Atlanta, Ga. takes the territory of North Carolina, South Carolina, Georgia and Florida; Frederick D. Moran, 1416 Madison St., Denver, Col., will cover Colorado, Wyoming, New Mexico, part of Nebraska, Black Hills, South Dakota, Montana, Utah and Idaho.



New

Design

SALES

New

PRODUCTS



DUBLBRAK CIRCUIT BREAKER PANELBOARDS AND CABINETS

For 125 Volt AC or DC Service . . . 6 to 50 Ampere

IN ADDITION to the important advantages of (1) ® Standardized Panelboard Design — (2) A Perfect Fit on the Job — (3) Getting the Job Done on Time — (4) Dependable Quotations When They're Needed — (5) Deliveries When You Want Them . . . This new ® Panelboard Design includes all the added Selling Features of Double Protection of the

NEW ® DUBLBRAK CIRCUIT BREAKER

The new ® Dublbrak Circuit Breaker protects lighting and appliance branch circuits against sustained overloads or short circuits — when protection is needed!

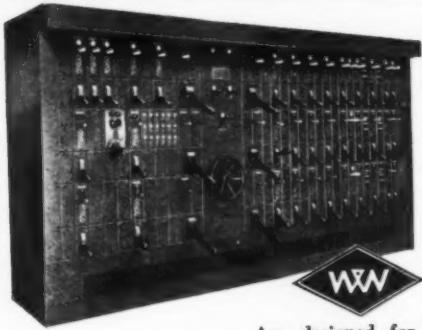
Unnecessary and annoying service interruptions are definitely avoided because of the properly engineered time lag features of the breaker thermal element!

Approved by Underwriters' Laboratories for both AC and DC service . . . Write for details.

When circuit is automatically interrupted, the red-dot signal button pushes out beyond the face of the unit and the handle remains at the "ON" position and indicates the tripped condition . . . To restore service it is only necessary to move the handle to the full "OFF" position and then to the "ON" position.



★★★ **SUCCESSFUL
and PROFITABLE**
SALES AND INSTALLATIONS ...

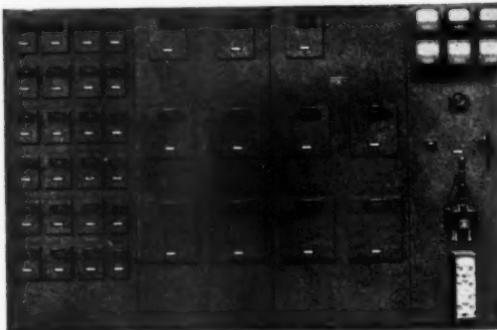


WURDACK
**REMOTE
CONTROL
STAGE
SWITCHBOARDS**

Are designed for all types of Theatres, Auditoriums, Fraternal Buildings and Schools where a modern system of lighting control is desired. Outstanding features are simplicity of design, convenience of arrangement and ruggedness of construction. Each installation is carefully engineered to meet its peculiar requirements.

WURDACK
**Deadfront
Switchboards**

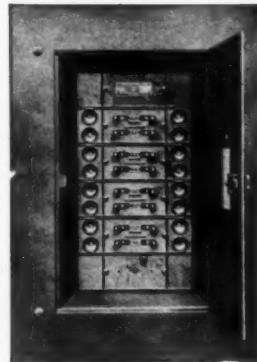
Of the Auto Shift Type are constructed of one-piece cold rolled steel panels with openings cut for individual Auto Shift Switch Units. These units are so constructed that all parts are dead when door is open. Fuses are mounted on insulated bases on back of steel enclosure eliminating all heavy parts from door.



A complete line of Dead Front Lighting Panelboards, constructed of standardized sections of molded Bakelite. All switches and fuse receptacles are readily removable from front of panel. All Cabinets made of Code Gauge Galvanized Steel. Fronts of full finished cold rolled steel, rust-proofed with black lacquered finish.

W.M. WURDACK ELECTRIC MFG. CO.

General Office and Factory
4444 Clayton Avenue St. Louis, Mo.
SALES OFFICES IN PRINCIPAL CITIES



When you install

WURDACK EQUIPMENT

you insure a modern job . . .

- * THE UTMOST IN CONVENIENCE
- * COMPLETE DEPENDABILITY
- * ALL AROUND SATISFACTION

In the News

[FROM PAGE 54]

Allis-Chalmers Manufacturing Co. has appointed William Arthur as Philadelphia District Office Manager to succeed the late J. E. Wray.

Tork Clock Company, Inc. recently elected C. J. White as president and A. A. Berard, vice-president.

A Correction

In our April issue, page 86, an item announced the purchase of the manufacturing business of Stanley & Patterson by Schwarze Electric Company. It stated that a New York office would be maintained at 150 Varick Street. This is not true. The main office of the Stanley & Patterson Division of the Schwarze Electric Company will be at Adrian, Mich.



Engineering Prospect

'Tis a proud father whose son plans an engineering course to prepare for joining dad in the business. And for example, Thomas F. Flynn, Jr., of Bridgeport, Conn., is all set for an M.I.T. course. He plans to come back to the Flynn Electric Co. on a permanent basis, instead of doing part-time work around the office as during school days.



INDUSTRIAL TEAMWORK—Active in serving Brooklyn's industries for twenty-six years is the Davidson Electric Co., a firm operated by four brothers. They all came into the business as they grew up. D. Davidson, the oldest brother, is missing in this picture, but we have a 75 per cent quorum. Jack, (left), looks after instrument surveys and tests. Morris runs the jobs and Harry handles purchases and some of the accounts.

STRONG ADHESION



NON-RAVELING
STRAIGHT TEARING
HIGH TENSILE STRENGTH
HIGHLY INSULATING
STRONG ADHESION

Sticking to its job of providing permanent insulation wherever applied, SECURITY is the quality tape that lives up to its name. Not merely tacky, its adhesive compound is of the strong, rubbery type that sticks and holds. That's why "live wires" depend on Security . . . the quality tape.

SECURITY



"Tune in—U. S. Royal Master Tire Program—C.B.S. Wednesday Evenings."

United States Rubber Company

U. S. Rubber Products, Inc., New York, N. Y.

**SECURITY BEYOND PRICE
AND SPECIFICATIONS**

ALSO U. S. ELECTRICAL WIRES AND CABLES, LINEMEN'S BLANKETS, SWITCHBOARD MATTING

KNOX

IS

IN

STEP

**WITH THE
WORLD'S FASTEST
GROWING INDUSTRY**

The Electrical Industry has progressed rapidly. Kindred industries have had to increase their facilities tremendously to keep in step. KNOX PORCELAIN, with the vision of a young organization, has always maintained a far-seeing policy . . . one that has kept it ahead of the insulation problems of the Electrical Industry. KNOX PORCELAIN has completed a 25,000 square foot addition to its factory, and now carries complete stocks at principal distribution centers throughout the United States.

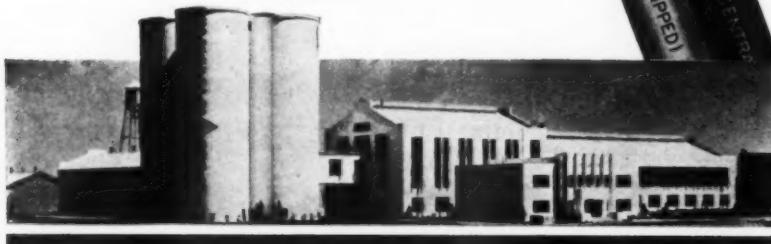
Write for our catalog today.

KNOX PORCELAIN CORPORATION
KNOXVILLE, TENNESSEE

30 TONS of CENTRAL RIGID STEEL CONDUIT Protect THE WIRING SYSTEM IN THE NEW CALIFORNIA HOME of Honey Dew Sugar

Significant of the preference which Central Rigid Steel Conduit enjoys in many of the nation's largest institutions and buildings from coast to coast, is the new Spreckels Sugar Refinery. Here, 200,000 tons of sugar beets are converted into 70,000,000 pounds of Honey Dew Sugar—a process that depends on an unfailing flow of electric power—and the permanent protection of Central Rigid Steel Conduit.

CENTRAL TUBE COMPANY
PITTSBURGH, PA.



Reinspection Dividends

Although immediate orders do not always result from reinspection reports, the contractor should keep close tab on his estimates for making corrections. In Norfolk, Va., where a city-wide inspection program was carried on in 1935 by an insurance rating bureau, many owners deferred action on rewiring. The Allen Electric Maintenance Company recently did several nice re-wiring jobs that were a hold-over from this program. J. O. Allen saved his original estimates, kept his customers interested and finally cashed in.



FIRE MARSHALL Horace M. Davis of Nebraska heads the rural inspection work in that state. With 7000 farms to be wired this year there is a big inspection job to be done. He admits that they can't interfere with the right of a farmer to make a bad contract but in the interest of safety they hope to make it tough for the chiselers and jerry-wiremen.

Bi-Linguists

Electrical inspectors in the Province of Quebec must speak both French and English to qualify for a position on the civil service rolls. J. M. Mochon of Montreal, Chief Electrical Examiner of the Department of Labor, recruits his force among bi-linguists only.

Weekly Roundup

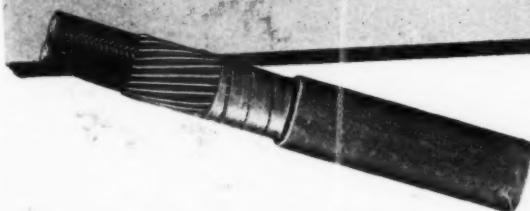
Jimmy McBride, big-job skipper for the Utilities Engineering Co. of Philadelphia, has a roundup on his jobs every week of all odd lengths and stray pieces of conduit or fittings. He says the various crews are accustomed to this rule, and their weekly policing accounts for sizable amounts of good material that would otherwise become damaged or lost among the rubbish.

HAZARD

SERVICE ENTRANCE AND DROP CABLES

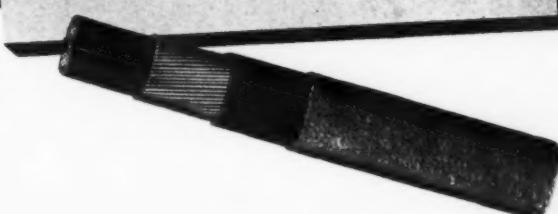
SERVICE ENTRANCE CABLE STYLE ABN

costs little, as it may be strapped to house without conduit. May be used with outdoor meter, or through foundation to entrance switch. Concentrically wound uninsulated neutral conductor and closely wound steel tape discourage current diversion.



SERVICE ENTRANCE CABLE STYLE UBN

differs from Style ABN, in that the steel tape is replaced by a heavier double-wrapped tape cushion, and that the concentric conductor has more wires giving a closer coverage to make it diversion-proof.



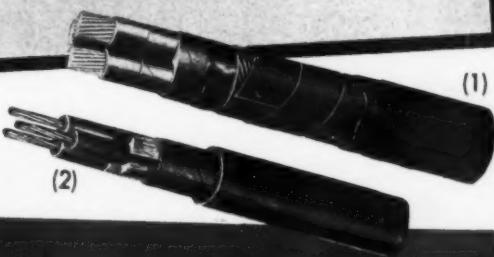
CONCENTRIC DROP CABLE TYPE SD

from pole to entrance cable on house. With single-hole entrance cap and rigid conduit, it is used from pole to meter. The closely wound concentric conductor makes it diversion-proof. Outer braid is finished with battleship grey paint.



UNDERGROUND SERVICE ENTRANCE CABLE

for service to or between buildings. Sizes No. 12 and larger. Armortite (1), and Hazasheath (2), are non-metallic armored, and withstand alternate wet and dry conditions, acid or alkaline moisture, and extremes of heat and cold.



HAZARD INSULATED WIRE WORKS

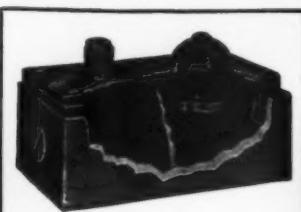
STORY OF THE OXONITE CO.
WORCESTER, WILKES-BARRE, PENNSYLVANIA

New York Chicago Philadelphia Atlanta
Seattle Dallas Washington



Pittsburgh Buffalo Boston Detroit
San Francisco St. Louis Los Angeles

FLOOR BOXES and



No. 252-R
TWO GANG BOX

Two gang Adjustable Floor Box with No. 208 Receptacle in one section. One cover plate with $\frac{1}{2}$ " Flush Brass Plug and the other cover plate with $\frac{3}{4}$ " Flush Brass Plug.



No. 284 DUPLEX
RECEPTACLE NOZZLE

With $\frac{1}{2}$ " brass pipe extension. Neatest and most compact fitting obtainable. Also available with $\frac{3}{4}$ " pipe extension. Fullman also offers Duplex Telephone Nozzles.

Sell and install LATROBE—the complete line for residential, commercial and industrial work. Catalog on request

FULLMAN MFG. CO.
LATROBE - PENN.

WIRING SPECIALTIES



No. 130 "LATROBE"
ADJUSTABLE WATER
TIGHT FLOOR BOX

No. 130 Box with No. 207 Bell Nozzle. Cut-away view illustrates how tapered unit receptacle fits tapered opening in adjustable ring. Design eliminates many small parts. Cover plate $3\frac{1}{2}$ " overall height $3\frac{1}{2}$ ".

TIME SWITCHES

With Capacities from
5 to 400 amperes

\$4.95
and up

FLASHERS

All Types and Arrangements
of Circuits for
Every Effect

\$6.50
and up

For Detailed Information
Write

Automatic Electric Mfg. Co.
MANKATO, MINN.



NO SET SCREW CONTACT

More perfect conductivity and greater permanency of connection is assured by ILSCO's triangular clamping wedge. It offers greater contact area and a surer grip than set screw alone could provide. Other ILSCO features:

- NO flattening or separating of stranded wires
- NO special tools required
- NO shearing effect whatsoever
- NO limitation to one size wire
- NO castings or forgings to increase their cost

NO need for you to search any longer for the PERFECT Solderless Connector... WE HAVE IT! Six Sizes Take Care of All Wires from No. 14 to 1,000,000 C.M.

FREE—A large display board bearing mounted samples of ILSCO lugs. Address Dept. EC

ILSCO COPPER TUBE & PRODUCTS, INC.
5629 Madison Road, Cincinnati, Ohio



Oil Burner Craftsmen

When C.I.O. activities were at their height in Philadelphia, an effort was made to form a local union for oil burner installers. This would have called for journeymen to be qualified to do wiring, some pipe fitting, asbestos and sheet metal work, and also cement work. Although viewed by some employers as a practical solution for this small-job craft jurisdiction problem, the matter has faded out.



INDUSTRIAL SPECIALIST—One of New Jersey's largest motor stocks and most experienced industrial service organizations is Venino Bros. & Co., Inc., of Newark, a firm that started in 1896. Ottmar Venino, vice president and treasurer of the company, contacts industrial executives and paves the way for sales, service shop and installation departments.

Special Markup

Various small parts and accessories needed in the Canadian motor shops, which must be ordered from the States, must be marked up at about 40 per cent above the purchase price to cover the final delivered cost, says Adolphe Dombrowski, Electrical Rewinding Shop, Quebec. By the time duties, shipping and drayage is paid, this general markup seems to work out about right.

Double Dividends

Several years ago a small Providence, R. I. manufacturing concern gave an order to Irving Coken of the Coken Company, to correct an installation that was made by a chiselling competitor. The job was given close attention, as were later service calls. Today this manufacturer boasts the largest plant of its kind in the world, and the Coken Company does all the wiring and maintenance. No electrical force is employed by the plant.



It's a Big Idea...

Wiring jobs that follow extension of electric service into rural areas open up big new business. Buildings are almost universally of frame construction — ideal for ROMEX. And ROMEX is even more the ideal wiring material for the purpose. Light weight, easy fishing (smooth sur-

face), thumb-pressure flexibility for working into cramped spaces, simple stripping — here is a means of pricing jobs so that you can make friends and sell complete wiring installations. Does not rust or corrode; ideal for farm buildings. Order ROMEX by name. Your electrical wholesaler stocks it. A General Cable product.

**GENERAL CABLE
ROMEX***
NON-METALLIC
SHEATHED CABLE



*TRADE-MARK

ALSO "GUARDIAN" BUILDING WIRE FOR CONDUIT INSTALLATIONS

About NECA

EXECUTIVE COMMITTEE TO CHICAGO, JUNE 14TH

The mid-year meeting of the NECA Executive Committee will be held at the La Salle Hotel in Chicago, on Tuesday and Wednesday, June 14th and 15th. Among the important matters to come before the Committee at this meeting is the report and recommendations of the Labor Relations Committee, which met in Chicago on April 11th.

NEW SERVICES IN DENVER

A short time ago the Denver Chapter engaged the services of a full time office secretary to take care of all office routine and to make all outside contacts necessary in the name of the Association. They now have a tie-up with the National Retail Credit Association through its local chapter. This makes credit information available to any contractor in the Denver Chapter.

The chapter is establishing a stock record of all remnants and odd quantities of stock in the possession of each member. This makes it possible for any member to call the chapter office and find out immediately if he can procure an odd size or quantity of material. It is thought that this procedure will bring a substantial savings for all.

PEAK VISITS CALIFORNIA

Visit of Earl Peak, president of the National Electrical Contractors' Association, to California, as the featured speaker for the Pacific Coast Electrical Association convention in San Francisco May 26, was made the occasion for a number of contractor and industry meetings.

Most spectacular of these was the first annual Electrical Industry Conference sponsored by the Electrical Development League of Southern California at the Hollywood Roosevelt Hotel, May 19. The conference here took the entire afternoon and evening. Mr. Peak was the dinner speaker in the evening. Other items on the program included a talk by A. L. Stone, chairman of the conference and N.E.C.A. executive committeeman for Division 9; Ross Hartley, president of the

Electric Corporation and of the Electric Development League of Southern California; A. W. Schanuel of the National Adequate Wiring Bureau, New York, and Walter L. Stickel of the Adequate Wiring Bureau of the League who spoke on adequate wiring; a playlet by R. E. Smith, Southern California Edison Company; a talk by Wm. O. Harris, director of publicity, F.H.A.; and industry responses from P. G. Spilsbury, consulting engineer, Anaconda Wire and Cable Company; J. A. Duncan, Westinghouse Electric Supply Company; Herbert L. Evans, Nicholas Electric Company, contractor; and Frank McGinley, McGinley Electric Company, contractor; Al Rea of the Rea-Gallup Company, dealer; E. F. Scattergood, chief electrical engineer, Bureau of Power and Light; and W. C. Mullendore, executive vice-president, Southern California Edison Co.

Other meetings were held at Fresno, Sacramento and San Francisco with the contractors' organizations in each city. Ted Curry, president of the Fresno Association, and H. H. Courtright made the arrangements for the Fresno meeting. J. D. O'Connor, president of the Northern California Electrical Contractors' Association, planned for the Sacramento meeting. Kenneth Ryals, president of the San Francisco Electrical Contractors' Association had plans in charge for the joint San Francisco-Oakland and bay region meeting Wednesday evening, May 25.



SOUTHEASTERN BOOSTER—Ralph H. Bouligny of Charlotte is one of North Carolina's ardent supporters of statewide adoption of the National Adequate Wiring Program. Daddy of the N.C. Electrical Contractors' Association, here he expresses his views at a recent A-W turnout in Charlotte.

PROTEST MAZDA LAMP DISCOUNTS

The Greater Kansas City Chapter, N.E.C.A., adopted the following resolution at its meeting on May 7, 1938:

"WHEREAS, The sale of Mazda incandescent lamps has been an important item in the business of electrical contractors, and

"WHEREAS, The profits on this part of the business depend upon compensation based on the momentary annual volume of Mazda lamps sold, and

"WHEREAS, Economic price declines, reducing the cost of Mazda lamps to the consumer, are highly commended,

"BE IT RESOLVED, That we protest against the serious reduction in the margin allowed for the sales effort of dealers operating under agency agreements resulting from these price reductions of lamps, and

"BE IT FURTHER RESOLVED, That we protest the policy of manufacturers in extending to the public such price reductions at the expense of the compensation to which their dealers and agents are entitled, and

"BE IT FURTHER RESOLVED, That this resolution be given suitable publicity among members of the National Electrical Contractors Association and that the manufacturers of Mazda incandescent lamps be informed of its adoption."

CHICAGO ESTIMATORS HONOR PATTERSON

At their meeting on May 3, the Electrical Estimators Association of Chicago adopted a resolution instructing their Secretary to write the following letter to George W. Patterson, Toronto, Ont., chairman of the NECA Cost Data Committee:

"At our Estimators Association meeting last night, the N.E.C.A. Manual of Labor Units, you so kindly presented to us, were distributed. The members were so appreciative of this gift that they instructed me, as secretary, to formally acknowledge the receipt of them and thank you sincerely for them.

"However, I gathered from the discussion, that it was not the intrinsic value of this book that mattered so much, but rather a tacit admiration for a man who was rendering a service for the benefit not only of his fellow countrymen, but those of his neighboring country. It is also felt that your willingness to accept suggestions from groups such as ours will be one big reason why your work in this field will succeed."

SEATTLE WIRING ON ITS WAY

The Seattle Electrical Industry Promotion Committee has put into effect an adequate wiring program sponsored by the Electric Club of Washington. The word comes from S. G. Hepler, National Com-

This NEW device Protects Both YOUR customer and YOU

**YOUR customer against
danger, expense and annoyance**

The Fustat cannot be replaced with a penny or other substitute for the fuse — or with a size too large to protect.

The user is protected against anyone unwittingly creating a fire or personal injury risk thru haphazard practices.

But that's not enough . . . A non-tamperable fuse that would blow on starting currents would be an impractical device — a terrible nuisance — so the Fustat . . .

Wipes out any excuse for tampering because it stops needless blowing.

Because of its long time-lag a Fustat won't blow when motors start on washing machines, refrigerators or other appliances.

An ordinary circuit can be loaded right up to capacity and yet protected with a 15 ampere Fustat. It gives SAFE protection without useless blows.

Prevents hazardous burnout of flexible cords . . . in spite of long time-lag

The Fustat contains a fuse. The ability of a fuse to protect against dangerous cord shorts, grounded sockets, etc. is well known.

The quick action of the Fustat on such dangerous "household shorts" prevents spraying of molten metal, starting of fires, burning of users.

Fits present fuseholders

Through the use of an inexpensive adapter, that locks in place, the Fustat fits in any standard Edison base fuseholder.

On new jobs you can specify that panels, switches, etc. be equipped with Fustat bases. Retails at 7½¢



YOU against loss of profit

Since the Fustat cannot be replaced with a penny or other substitute for the fuse, or with a fuse of too large a size, it positively stops the user from dangerously overloading his circuits.

If additional circuit capacity is needed the user cannot readily side-step the issue at the sacrifice of safety. Yet the Fustat . . .

Permits adding more appliances to present circuits.

Because it doesn't blow needlessly the Fustat permits loading up the circuit to capacity. This often means it is possible to close a sale that would be missed if the expense of a new circuit had to be stood by the user.

Thus you can expand the use of present circuits with perfect safety — and without incurring needless blows.

Abolishes needless "blown-fuse" service calls

Calls made just to replace a fuse blown by a motor-starting current are wasteful and costly to everybody.

The user loses time and temper and often money when service is off.

The contractor or dealer loses if the user kicks about paying full cost of a call where the only work done was to replace a fuse. On top of this the service man has been dragged away from more profitable work.

The Fustat offers a common-sense way to stop this wasteful evil — It doesn't blow needlessly.

It is just good business to sell, install and use Fustats

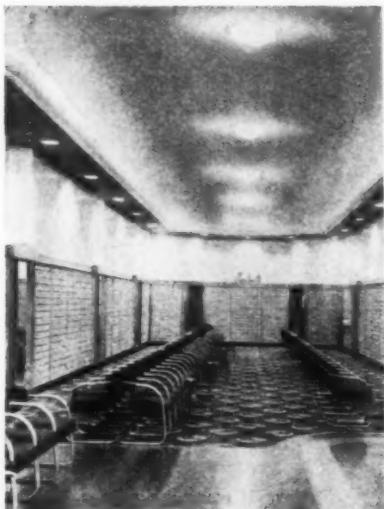
The FUSTAT

For
full information
write to any
of these firms

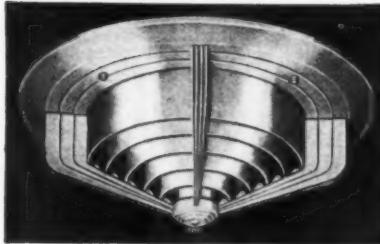
BUSSMANN MFG. CO., University at Jefferson, St. Louis, Mo.
JEFFERSON ELECTRIC CO., Bellwood, Ill.
KIRKMAN ENGINEERING CORP., 121 Sixth Ave., New York City
NATIONAL ELECTRIC PRODUCTS CORP., Fulton Bldg., Pittsburgh, Pa.
UNION INSULATING CO., 277 Broadway, New York City



Marvelous Sales Room Illumination



with STER-LITES



Intense direct light that illuminates merchandise with interest-compelling effectiveness, plus diffused general illumination that rivals indirect lighting for eye comfort—that's the sales-building illumination produced by Ster-Lite Louver-Controlled Direct Lighting Units.

In Drug, Shoe, Jewelry and Men's Wear Stores, as well as Ladies' Apparel, Florist, and Electrical Appliance Shops—in almost every kind of retail establishment, Ster-Lites are producing sales lighting efficiency of irresistible appeal to alert merchants.



FACTS and FIGURES on Request. Write for literature.

STERLING REFLECTOR CO.
1435 W Hubbard St CHICAGO

About NECA

[FROM PAGE 62]

mitteeman from District No. 10. A kick-off dinner of the entire electrical industry was held at the New Washington Hotel on the evening of May 10, with 500 guests present.

The idea behind this dinner was to first educate the members of the industry on this adequate wiring program before it was taken to the public. The plan worked out by the committee under the chairmanship of J. J. Agutter, embraces a definite advertising program by the two utilities, the Puget Sound Power & Light Co. and the City Light, through their radio time and their regular space in the local newspapers, augmented by direct mail advertising.

At the same time a vigorous educational campaign, sponsored by individual electric firms is starting through a series of speakers before various clubs and civic organizations, utilizing the sound film "Power for Living". This campaign further includes the education of the local architects, together with the electrical workers in this vicinity.

WICHITA CHAPTER REPORTS

L. A. McBride, President of the Southern Kansas Chapter, N.E.C.A., at Wichita, has sent in the following report:

"We have been so busy here in Wichita putting and keeping our house in order. We meet every Monday evening and every meeting has been full of important business. We have 17 members in our chapter now out of 22 contractors in Wichita and usually have around 14 members out to each meeting. The following are a few of the more important things that we have accomplished;

New City Ordinance (Helped City Inspector draft this).

Better Cooperation between Inspection Dept. and Contractors.

Voluntary Code (Which took three attempts before passing).

Labor Agreement (Most all of our members now use union labor).

"We are working on a policy with the wholesale houses here in Wichita and they have promised us cooperation. We are also working on State legislation in which we hope to take an active part in the near future. But the biggest thing is the fact that the boys now have faith in one another."

Material for this department is supplied by the headquarters staff of the National Electrical Contractors Association, 420 Lexington Avenue, New York.

Insist on CERTIFIED RATINGS
Install AUTOVENT Ventilation



PORTABLE VENTILATOR

Every office, plant, home, kitchen, etc., requires individual room ventilation! With hot summer days ahead you will find a ready market for this unit! Can be quickly installed or moved from room to room! LOW PRICE, rugged, quality construction, exclusive AUTOVENT non-overloading features are good sales points! Bulletin No. 203 sent on request!



"31 Series" Propeller Fans

Will not churn air or overload motor. Gives economical ventilation. Ruggedly constructed. All sizes Certified Ratings. Write for Bulletin 200 and 201.

* At this season of the year, proper ventilation is the pulse of the hour! Are you prepared to get your share of this business? Write for our complete set of FREE bulletins, specification sheets, performance tables—today!

* Member National Association of Fan Manufacturers.

AUTOVENT FAN & BLOWER COMPANY
1815-21 W. Kostner Ave., Chicago, Ill.

GEDNEY
fine
FITTINGS



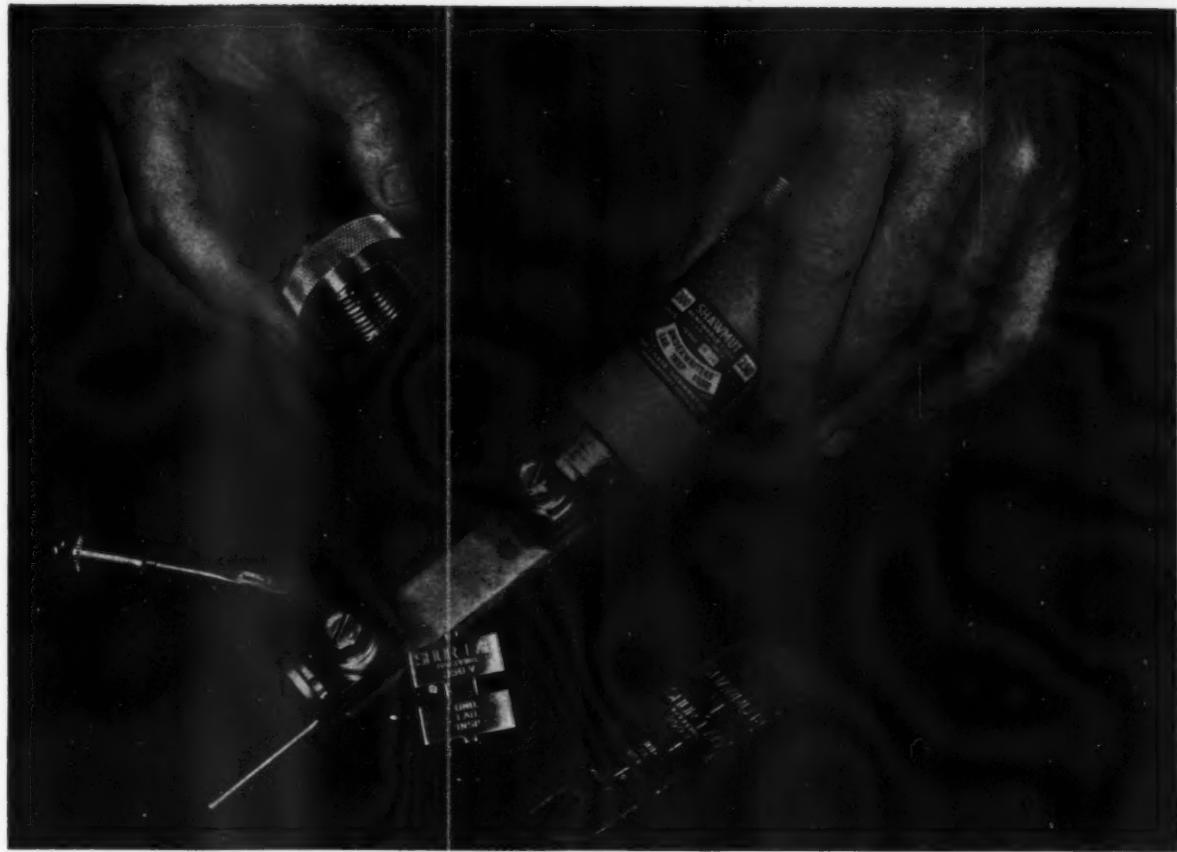
A new line of electrical fittings, designed by old-timers in the electrical business. Tested and proved in every detail. If your wholesaler cannot supply the GEDNEY LINE, write direct for details and prices.



Sole Sales Agent



HERON ELECTRIC SALES CORP. RCA BLDG., NEW YORK



WHERE SECONDS MEAN DOLLARS

Remove the cap, slide the fuse out, loosen two screws, replace the link, reset the screws, replace the fuse and the cap.

That's ALL, with a SHAWMUT SHUR-LAG FUSE, and you're in circuit again, at a saving in time and money. There are no costly shutdowns, with men and machinery idle.

SHAWMUT SHUR-LAG FUSES are the simplest and sturdiest time-delay fuses made. They offer the utmost in economy, service, and protection. They prevent needless blowing, but act in time to forestall damage, immediate or cumulative. And the price is no higher.

SHAWMUT SHUR-LAG

RENEWABLE FUSES

Approved by Underwriters' Laboratories

The CHASE-SHAWMUT COMPANY • NEWBURYPORT • MASSACHUSETTS
Fuse makers since 1893

EQUIPMENT News

New Color in Lighting

The Mazda lamp manufacturers have announced a line of fluorescent lumiline lamps for decorative color lighting, with an advantage 100-to-1 over tungsten lamps, from a lumen-per-watt standpoint. Present designs are confined to 15-, 20- and 30-watt ratings in the 18-, 24, and 36-inch lengths.

These lamps will provide hitherto unobtainable tints of colored light, and in some cases 120 times as much illumination for the current consumed as filament lamps of the same color, with only a fraction of the normal lamp heat. Suggested fields of application for these fluorescent lamps are: Theatre interiors, hotel dining rooms and lobbies, restaurants, night clubs and bars, stores of various kinds, show cases, wall cases, mirror lights, luminous signs.

The fluorescent lamp employs a 1-in. or 1½-in. diameter bulb containing a trace of



WARD HARRISON, of Nela Park, presents a new multicolored decorative lighting unit.

mercury and argon gas, and an inner coating of fluorescent powder. Ultra-violet radiations generated in the bulb strike the fluorescent coating and are re-radiated in various selected colors. To start these lamps requires small auxiliaries to be used singly with each lamp unit. The lamps have metal caps at each end with two base pins similar to those on radiotrons. Slotted lock-sockets have been designed to hold them. Present lumiline lamp sockets cannot be used for fluorescent lamps.

Approximate efficiencies announced for various colors are: Green, 60 lumens per watt; white, 32; pink, 22; gold, 20; blue, 18; and red, 3 lumens per watt. A daylight color is available that is hailed as the nearest approach to natural daylight so far produced by any artificial illuminant.

The lamps are to be marketed by the General Electric Co. and Westinghouse Electric & Manufacturing Co.



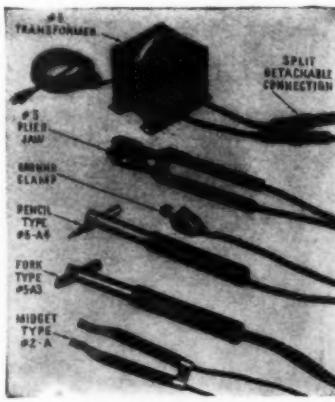
CORNING GLASS INSULATING TAPE

Glass Insulating Tape

Recently developed electrical insulating tapes, woven from glass yarns. Appearance and flexibility of ordinary textiles. Designed for insulation of coils for motors, generators and transformers, for cables and other electrical conductors. Withstand temperatures in excess of limits specified for Class B high temperature insulation. Impregnate readily with resins, gums and varnishes to form insulation impervious to moisture and of high dielectric strength. Corning Glass Works, Corning, N. Y.

Soldering Unit

An all-purpose Thermo-Grip electric soldering unit for all types of soldering work. Unit consists of transformer and four heads or tools. For use on a.c. All current carrying parts are insulated, making it safe. Where speed is necessary, a new foot-operated switch is available. Ideal Commutator Dresser Company, 1041 Park Avenue, Sycamore, Ill.



IDEAL SOLDERING UNIT



CARBOLOY FLAT DRILLS

Flat Drill

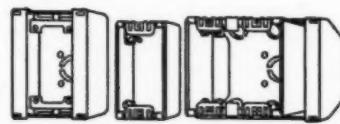
A flat drill with cutting edge made of Carbonyl cemented carbide. Manufacturer claims reduction in drilling time of 50 per cent in non-metallic construction materials. Used in portable electric drills and hand braces for holes in concrete, slate, tile, brick, wallboard, marble, asphalt. Designed for use by electricians, plumbers, general contractors, sign hangers, building and airport maintenance men. Carbonyl Company, Inc., 2985 East Jefferson Ave., Detroit, Mich.



FOSTORIA CANOPY LOCALITE

Canopy Lighting

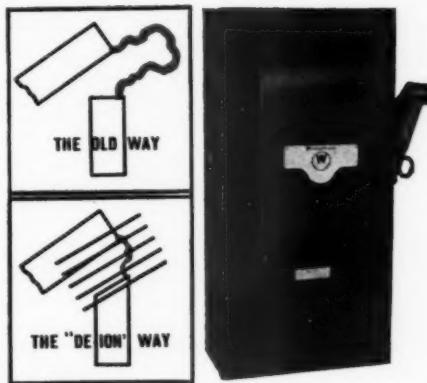
Model "WC" canopy localite is 36 inches wide and available in 21-foot multiple lengths with a minimum of 5 feet. Accommodates either 150 watt or 200 watt lamps, one socket to each 2½-foot length. Delivers an average of 33 foot candles with two 150 watt lamps over an area of 4-ft. by 6 ft. at a mounting height of 48 inches above working surface. The Fostoria Pressed Steel Corp., Fostoria, Ohio.



REESE OUTLET BOXES

Adjustable Outlet Boxes

These outlet boxes provide adjustment to thickness of face wall from ½-in. to 4-in. Facing materials can be cut to straight sides of extensions. Back boxes have a combination ½-in. and ¾-in. knockout. Extension can be set flush, independent of position of back box. Extensions made 1-in. to 4-in. deep, have an adjustment of ¾-in. Back box in two shapes—square and angular. Extension has straight sides and square corners. Wm. W. Reese Manufacturing Co., 3200 Oxford St., Philadelphia, Pa.



In the past, arcs have been broken by "stretching." The "De-ion" quencher confines, divides and extinguishes arcs instantly—obviously preventing concentration of burning heat on contacts or arc barriers.

"DE-ION" GRIDS QUENCH DESTRUCTIVE ARCS

You won't be bothered with customer complaints about flashovers and burned contacts when you install Westinghouse Safety Switches with "De-ion" arc quenchers. The "De-ion" feature on all Westinghouse 575 and 600-volt switches gives positive protection by quenching arcs so fast that they can do no damage.

And years of trouble-free service are assured by these added Westinghouse features: Diamond pointed jaws and extended blades confine beading to points outside the contact areas—one-piece copper parts eliminate loose connections and keep contacts cool and tight.

Simplicity of construction makes Westinghouse Safety Switches easy to install. Parts completely visible, for easy inspection.

All commercial types and ratings available from your electrical wholesaler.

WESTINGHOUSE ELECTRIC & MANUFACTURING CO., EAST PITTSBURGH, PA.

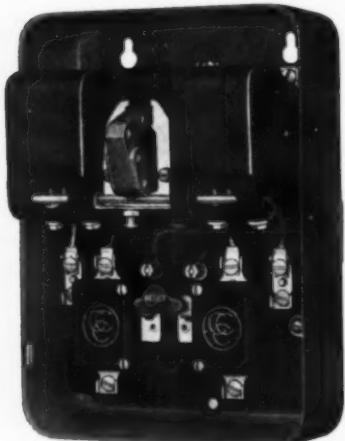
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[FROM PAGE 66]

Automatic Starter

Bulletin 6013 starters connect squirrel cage induction type a.c. motors directly to the line. Also used as primary switches for wound rotor induction motors. Consist of a multi-pole a.c. contactor and a two-element overload protective device. Enclosed in steel cabinet equipped with knockouts and arranged for padlocking. Some of the features are across-the-line starting, non-reversing, overload protection, no voltage protection or release, cadmium plated metal parts, molded asbestos arc shields, ample wiring space, heavy duty magnet operated contactors. Clark Controller Company, 1146 East 152d St., Cleveland, Ohio.



CLARK A.C. AUTOMATIC STARTER

Pressure Fans

A new line of propeller type fans designed for use in duct systems and for similar cases where resistances to air flow are encountered. Has non-overloading feature. Available in various sizes and horse power ratings to give desired results at various stages of pressures. Propellair, Inc., Springfield, Ohio.



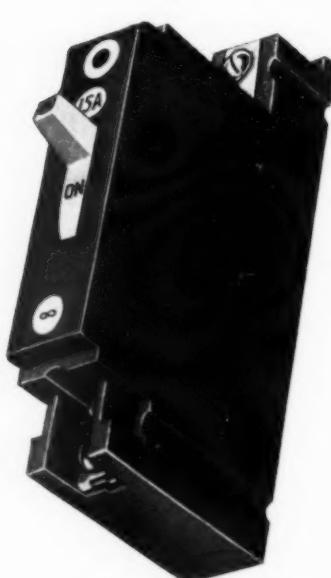
PROPELLAIR FAN



BARDCO EMERGENCY PLANT

Emergency Plant

This emergency stand-by electrical plant will resume power operation automatically when regular power lines have failed, with a lapse in time of only three seconds, it is claimed. Consists of a Ford V-8 engine, generator and automatic controls. Designed to meet specific requirements of any desired voltage or frequency and a voltage regulator maintains constant voltage, irrespective of load demands. Safety controls, which can be set at any predetermined point, give warning signal in case of overheating or low oil supply. Bardco Corporation of America, 6670 Lexington Ave., Los Angeles, Calif.



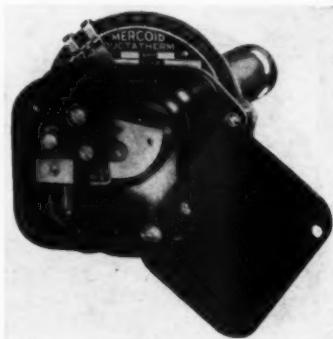
FRANK ADAM CIRCUIT BREAKER

Circuit Breaker

A new bi-metallic thermal circuit breaker called "Dublbrak" for 125-volt a.c. or d.c. service in capacities from 6 to 50 ampere. It is trip free, non-closable on short circuits or heavy over loads. Automatic, positive protection against short-circuits or sustained overloads, and lag characteristics that prevent needless circuit interruptions when momentary overloads occur. Has a red dot indicator signal button. Frank Adam Electric Company, St. Louis, Mo.

Temperature Control

A new control, known as Ductatherm, is designed for control of temperature in air conditioning ducts. Also used as limit or fan control for warm air furnaces. Many industrial applications, such as drying ovens, baking ovens and for temperature control of air and gas not injurious to brass. Actuated by small and sensitive bimetal spiral, located on end of control stem, which projects into duct or chamber where accurate and dependable temperature regulation may be maintained. Adjustment is located on outside of instrument. Two ranges available—50 to 300° F., and 250 to 500° F. Furnished standard with flat mounting flange. Also available with adjustable flange for slope mounting. The Mercoid Corporation, 4201 Belmont, Ave., Chicago, Ill.



MERCOID CONTROL

Time Switch

A new line of automatic electric time switches known as Model W. Line consists of only three types but covers same variety of applications formerly requiring ten different types. In addition to single throw, single and double pole types, a third type controls two circuits independently, giving eight different combinations of two-circuit control. Powered by 110-volt self-starting synchronous motor, it is for use on a.c. only and furnished for either 50 or 60 cycle current. Four combination knockouts and ample wiring space provided. Reliance Automatic Lighting Co., Racine, Wis.



RELIANCE TIME SWITCH

Private Interior Telephone Systems

OFFER YOU "VIRGIN TERRITORY"



And by that we mean there is a rich unclaimed market for private telephone equipment. It includes countless offices, shops, factories and residences. Your share of this new business is waiting for you.

Business is fast becoming communication conscious—keenly aware that swift, accurate interior communication means lower costs—greater efficiency.

Go after this business with Automatic Electric private telephone equipment. The line includes a type to meet every need—every purse. Shown below are four of many varieties available. Our field representative will gladly supply you with literature, prices and discounts, as well as work with you on specific jobs. Call on him for help.

INTERCOMS

Common - talking, selective-ringing systems in capacities of two to eleven stations. Beautifully designed, and durably constructed for long faithful service.



AUTO-COMS

Deluxe intercom systems, providing selective talking and selective signaling service for a maximum of ten stations, and up to five connections at one time. No automatic switchboard needed.

P-A-X's

Private Automatic Exchange systems, available in all capacities. Use standard automatic telephones and provide for a variety of special communication services.

AUTOMATIC ELECTRIC

PRIVATE INTERIOR TELEPHONE SYSTEMS

Distributed by: AMERICAN AUTOMATIC ELECTRIC SALES COMPANY, 1033 West Van Buren Street, Chicago, Illinois
Sales and Service Offices in Principal Cities

*

In Canada: Canadian Telephones & Supplies, Limited, Toronto

UNDERGROUND, on every type of distribution system, Transite Conduit is installed without a concrete envelope. This duct is simply laid in the ditch and the ditch back-filled. Its asbestos-cement composition means virtual freedom from troubles caused by corrosion and vibration, immunity to electrolysis.



ON EXPOSED LOCATIONS, corrosive fumes, gases and moisture have practically no effect on Johns-Manville Transite Conduit. For this modern duct is weatherproof, rotproof and cannot burn. Even under severe service conditions, it provides the permanence and virtual freedom from maintenance your customers demand.



ARE YOU TAKING THE FULL PROFIT FROM YOUR WIRING JOBS?



"CONCRETING-IN" is sometimes necessary. In such cases Transite Korduct, made of the same asbestos-cement composition as Transite Conduit, is the ideal material to use. It lays rapidly . . . lines up accurately and easily. And its light weight assures sizable reductions in material costs.

Transite Ducts pay off in bigger contracting profits and increased customer satisfaction

WHEN you lay Transite Conduit, no concrete casing is needed. Just excavate and put the duct down. Lining-up is fast and accurate. Harrington Couplings eliminate expensive threading operations. Jobs don't drag out . . . and what you save in time, labor and materials shows up in your accounts as extra profits.

However, when "concreting-in" is necessary, the light weight of Transite Korduct, with consequent savings in material and handling costs, helps make up for the expense of the envelope. Thinner walled than Transite Conduit, but otherwise identical, it assures the same easy, rapid installations.

These asbestos-cement ducts have

everything your customers want. Fireproof, rotproof and weatherproof, they are practically impervious to corrosion. Because of their smooth bore, cable installation and removal is always easy, even after years of service. Furthermore, the long, maintenance-free performance given by Transite Ducts more than satisfies your customers . . . and their good will is your best reputation builder.

When you're submitting quotations on any wiring job, big or small, look into the many money-saving advantages of J-M Transite Ducts. You'll see for yourself how you can lower your bid . . . do a better job . . . and raise your profit margin. Write for further information to Johns-Manville, 22 E. 40th St., New York, N. Y.



Johns-Manville TRANSITE CONDUIT TRANSITE KORDUCT

for use underground without concrete
envelope and for exposed locations

for installation in concrete

SORGEL AIR-COOLED Transformers

Save Money

by obtaining more than one voltage from one service, and the proper voltage for each type of apparatus.



Here are several advantages of SORGEL Air-Cooled Transformers: Eliminate expense of fire-proof vaults or enclosures. Approved by Underwriters.

Require no oil or other liquid.

Require no further attention after installation.

Can be installed on the wall, ceiling, floor, a post, or on equipment.

May be installed at the place when the change of voltage is desired, eliminating long runs of wiring.

Can be connected directly to a conduit system without any extra fittings.

Stock sizes $\frac{1}{4}$ to 50 Kv-a.
Larger sizes and special types built to order quickly.
Write for literature with diagrams and prices.

SORGEL ELECTRIC CO.

No. Plankinton Avenue Milwaukee, Wis.

EQUIPMENT News

[FROM PAGE 70]

Circuit Breaker Relay

This Type B relay with magnetic release is usable as an overload cutout, a manual reset annunciator drop and an off-level indicator, in conjunction with a pendulum bob. Intended for low voltage service up to 24 volts. Three-contact stack mounting positions permit three operating switches at a single level. Where necessary, additional contact combinations can be added to any one of three stacks. Can be used in multiple assemblies with common reset arm. G-M Laboratories, Chicago, Ill.



G-M LABORATORIES RELAY

Voltmeter

A voltage attachment, called "Voltor", is designed for use with any existing 50 ampere element of either type A or AX Tong test or 75 ampere element of type B or C. Enables operator to measure both a.c. and d.c. voltages up to 600-volts. Has three ranges—0-150, 0-300 and 0-600-volts. A self-contained unit. A chart on side of this attachment is a ready means of converting reading of tong test element into volts. Columbia Electric Manufacturing Co., 4519 Hamilton Ave., Cleveland, Ohio.



COLUMBIA VOLTMETER



A SCREW DRIVER

and
a



TWIST

. . . nothing else required to make a perfect joint with

The MARR CONNECTOR

Just pick up a post card and say "I'd like to try the MARR." We'll send a sample, FREE. No obligation.

Approved by Underwriters

THE RATTAN MANUFACTURING CO.

522 STATE STREET
NEW HAVEN, CONN., U. S. A.
GENERAL SALES AGENTS HATHeway AND CO.
220 CHURCH STREET NEW YORK, N. Y., U. S. A.

VICTOR "FORCE AIR" EXHAUST FANS

**Complete Line
6" to 28"**

★ ★

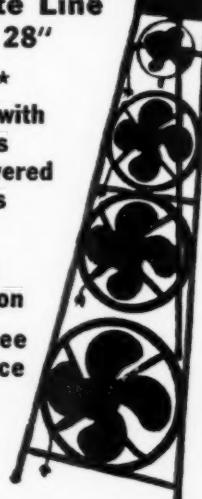
**Equipped with
Victor's
Super-Powered
Motors**

★ ★

**Rugged
Construction
Trouble-free
performance**

★ ★

**Special
Low
Prices!**



**Ask Your Jobber or Write for
Catalog to
VICTOR ELECTRIC PRODUCTS, INC.
803 Reading Road Cincinnati, Ohio**

HOW TO GET AN ORDER - THIS MORNING!



A TIP THAT MEANS BUSINESS FOR YOU CASH IN ON IT!

"Right in your neighborhood—very soon—somebody is going to make a neat profit selling the Combination Standlite to gasoline service stations. Why? Because it sells so easily! Designed especially for service stations, it combines proper pump island illumination with close-up floodlighting of buildings with low wattage lamps and consequent current saving. With modern illumination like this, the average service station can double its night business. That's why gas stations everywhere are buying it. Try it on a few—this morning—and see how quickly it sells.

"If you have neglected to get full information about it, drop me a line today. Ask for the catalog sheet on the Combination Standlite."

Sunny Lumen
the Goodrich Reflexpert



**NEW!
THE COMBINATION
STANDLITE**

Two lights in one—illuminates pump islands, floodlights buildings. The floodlight, mounted on the Standlite, has universal adjustment for correct positioning. Fitted with water-tight glass lens, it's a weatherproof fixture of vitreous-fired enamel. Fits any standard pole.

GOODRICH

ELECTRIC COMPANY

OFFICES IN ALL PRINCIPAL CITIES

GENERAL OFFICES & FACTORY, 2902 NORTH OAKLEY AVENUE, CHICAGO, ILLINOIS

Electrical Contracting, June 1938

Business Cards reflect quality!

It isn't strange for contracts to go to firms that show signs of the best quality, regardless of whether they are the best known.

For in this day of hard competition, buyers don't like to feel they are paying sales expense; and those who cover this in the "small incidentals" column by using Wiggins Vellotype for business cards are the ones who get the business.



Vellotype is the latest in raised printing which compares with the most expensive processes in every way except the price.

SEND FOR SAMPLES

Compare your present business cards with VELLOTYPE

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A product of THE JOHN B. WIGGINS COMPANY
Established in 1857 1173 Fullerton Avenue, CHICAGO

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A complete line of thoroughly dependable quality time switches with innumerable exclusive features, giving you more time switch sales opportunities.

For 28 years the name of Reliance has stood for the best in the time switch field. A good line to handle because profits are not eaten up by expensive come-backs.

See your wholesaler or write for complete descriptive literature

RELIANCE AUTOMATIC LIGHTING CO.
1937 MEAD STREET RACINE, WIS.

SHERMAN
Fixture Connectors
Brass or Bronze

APPROVED



Corner View
U. S. Pat. No. 1352032



End View

THE PERFECT SOLDERLESS CONNECTORS

Only One Size Needed

Fits all wires No. 12 or smaller

The screws can't come out

All Brass—or Bronze)

Simple and Quick

The bronze fixture connectors are made especially for outdoor use. Universally favored for Neon sign work. Made of high copper bronze—weather resisting. Construction same as the brass.

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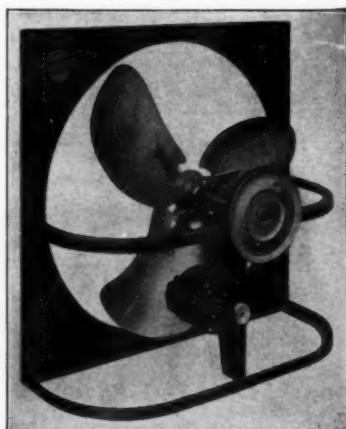
Cylinder Lantern Fixture

Modern lines that serve to embellish the glass cylinder light source feature Herwig wall lanterns. Made in several sizes, these lanterns are suitable for various commercial and institutional applications at entrances and also, indoors. The No. 520A unit shown is 13½ in. overall with 4-in. by 9-in. glass cylinder. Made in cast iron, bronze and aluminum. The Herwig Co., 1753 North Sedgwick Street, Chicago, Ill.



Attic Fan

The Chelsea attic fan features lightweight welded steel frame construction to insure rigidity and ease of installation in walls or penthouses. Its lower frame member provides a self-supporting base when this fan is used as a portable unit. The three-blade propeller has a one-inch shaft which is V-belted to an adjustable-bracket motor. Shaft bearings are insulated from the frame with synthetic rubber. Sizes range from 30 in. to 48 in., with motor ratings from $\frac{1}{4}$ to $\frac{1}{2}$ h.p. Chelsea Fan & Blower Co., Inc., 370 W. 15th St., New York, N. Y.



CHELSEA ATTIC COOLER

A WESTINGHOUSE SPECIFICATION MEANS LONG-TERM BUILDING INSURANCE

RIGHT-HAND MAN

*Only one organization to contact
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Ask for your copy of the 1938 Architects' and Engineers' Data Book describing all Westinghouse building products.

J-93807A



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the Building Industry*



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Exactly what your customers want

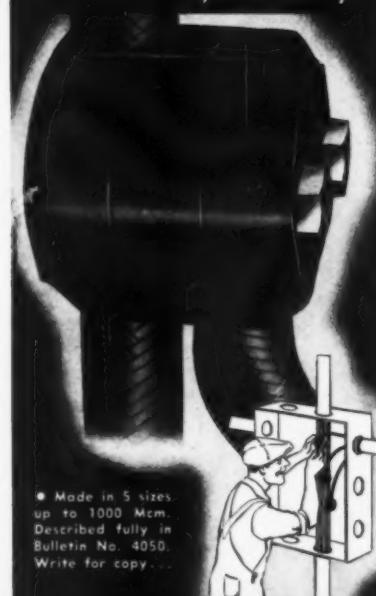
★ Without the least trouble the lamp and reflector are easily removed as a unit—no tools, no trouble, no breakage. In service they afford secure mechanical and electrical connection. Besides being highly efficient in lighting value the reflector can be quickly removed and easily cleaned, anytime. It is the ideal reflector for immediate and continuous profitable business.

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TAPIT**
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